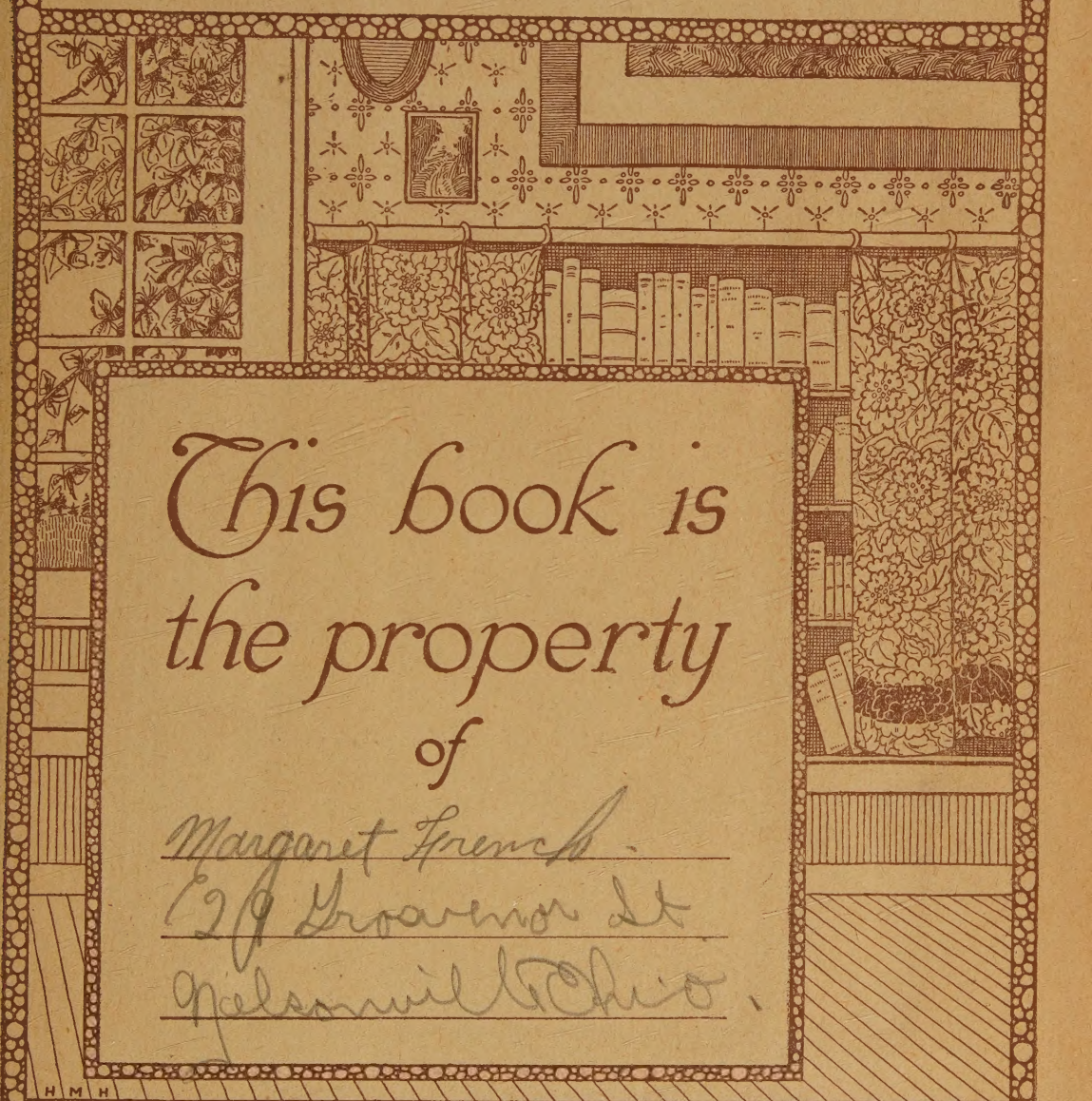
THE AMERICAN EDUCATOR

PRACTICAL HELP IN HOME AND SCHOOL

AMERICAN

Education commences at the mother's knee, and every word spoken within the hearing of little children tends towards the formation of character. —Ballou

EDUCATOR



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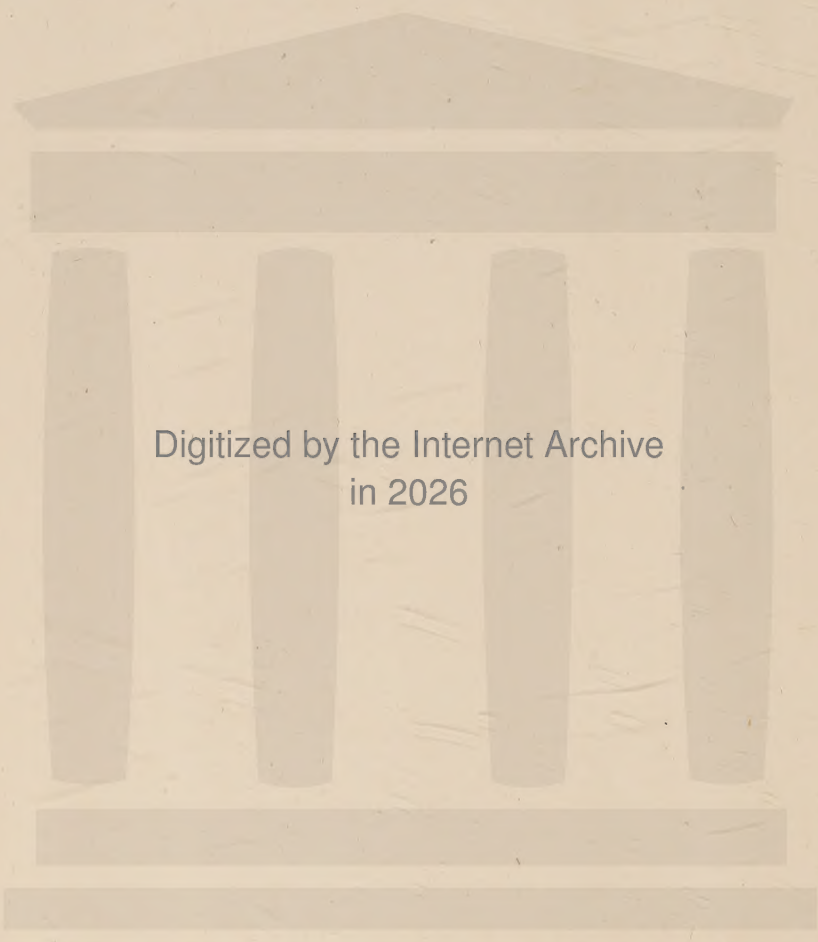
Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it.
—Samuel Johnson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THE AMERICAN EDUCATOR

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PEACE EDITION

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VOLUME SIX

OSWE'GO, N. Y., the county seat of Oswego County, thirty-five miles northwest of Syracuse, on Lake Ontario, at the mouth of the Oswego River and at the outlet of the Oswego Canal, now a part of the State Barge Canal, and on the Delaware, Lackawanna & Western, the New York, Ontario & Western and on the New York Central railroads. The city is on a slight elevation above the lake and has seven parks, broad streets and pleasand drives along the river and lake shore. It contains a state normal school, Gerritt Smith Library, a Federal building, a city hall, a home for the homeless, two orphan asylums, a courthouse and a state arsenal. The city has an excellent harbor and conducts a large trade in coal, grain and lumber. The government maintains a life-saving station. There are machine shops, boiler and engine works, a large starch factory, knitting mills, and factories which make pumps, glucose, gearing, matches and underwear.

Oswego was established as a military and trading post about 1724 and was chartered as a city in 1848. During King George's War and the French and Indian War, it was regarded as a very important position and was the scene of numerous engagements. Population, 1910, 23,368; in 1917, 24,219 (Federal estimate).

O'THO I (912–973), called OTHO THE GREAT, an emperor of Germany and founder of the Holy Roman Empire. He succeeded his father, Henry I, as king of Germany in 936 and was immediately compelled to go to war to maintain his right to the throne. After a struggle of many years he overcame and gained possession of the duchies of Swabia, Bavaria and Lorraine. In 951 he went to Italy and there was crowned king of the Lombards; in 962, after his expulsion of Berengar II, who had seized upon the territory bestowed upon the Pope by Pippin and Charlemagne, he was crowned emperor at Rome. The Pope having violated a pledge made to him, Otho invaded Italy and deposed the Pope, causing Leo VIII to be elected in his place. He was later involved in a war with the Byzantine Empire, which had refused to acknowledge his rights.

OTIS, JAMES (1725–1783), an American statesman, born at West Barnstable, Mass., and educated at Harvard College. He practiced law for a time at Plymouth and later at Boston, where he attained a wide reputation. He was elected advocate-general of Massachusetts, but in 1761, when request was made for the issuance of writs of assistance, he resigned and became the leading counsel in opposition, making a notable speech which brought him into active leadership of the patriot part. He added to his reputation by numerous pamphlets against the British policy, especially his *Vindication of the Conduct of the House of Representatives* and *The Rights of the British Colonies Asserted and Proved*. It was at his suggestion that the Stamp Act Congress assembled in 1765, and he was the author of the address sent by it to the House of Commons. He openly defied the royal authorities of the colony and succeeded in checkmating many of their moves against colonial interests. In 1769 he became involved in a dispute with a British officer and received a cut in the head, which resulted in insanity, from which he never fully recovered. He was killed by lightning at Andover, in the fifty-eighth year of his life.

OT'TAWA, an important tribe of Algonquian Indians who occupied the Upper Ottawa River in Canada. They were friends of the French and so were brought into disastrous conflict with the Iroquois and later with the Sioux. They sided with the English against the Americans in the War of 1812. Pontiac (which see) was a famous chief of this tribe. At present there are a number of Ottawas in the Canadian province of Ontario; the majority of those in the United States live in small settlements in Lower Michigan.

OTTAWA, ILL., the county seat of La Salle County, eighty-four miles southwest of Chicago, at the confluence of the Fox and Illinois rivers, on the Illinois & Michigan Canal and on the Chicago, Rock Island & Pacific and the Chicago, Burlington & Quincy railroads. The city has a very beautiful location and is the seat of Pleasant View

College and Saint Francis Xavier Academy. It has a high school library, Odd Fellows' and Reddick's public libraries, the Illinois Appellate Court building, four public parks and two hospitals. There are deposits of coal, clay and glass sand in the vicinity, and the city has manufactures of implements, pianos, organs, glass, pottery and other clay products, wagons and various other articles. It is only a few miles from Starved Rock, famed in Illinois history. The town was settled about 1830 and was incorporated as a city in 1853. The commission form of government was adopted in 1900. Population, 1910, 9,535; in 1917, practically unchanged.

OTTAWA, KAN., the county seat of Franklin County, forty miles southeast of Topeka, on the Marais des Cygnes River and on the Atchison, Topeka & Santa Fé and the Missouri Pacific railroads. Ottawa University is located here, and the city has a Carnegie library, about a score of churches and Forest Park, where the county fair and Chautauqua assemblies are held. The notable buildings include a county courthouse, two hospitals, a city hall and a Federal building. There are large nurseries, grain elevators, railroad shops, flour mills, windmill, gas engine and pump works, creameries, foundries and carriage factories, and the city also has a good trade in grain, wool and live stock. The place was founded by John Tecumseh Jones, a missionary to the Indians. The commission form of government was adopted in 1913. Population, 1910, 7,650; in 1917, about 8,100 (Federal estimate).

OTTAWA, ONT., the capital of the Dominion of Canada, the county seat of Carleton County and the fifth Canadian city in population, is situated on the south bank of the Ottawa River, 116 miles by rail west of Montreal. It lies at the junction of the Rideau with the Ottawa, and has steamer communication with Great Lakes ports by way of the Saint Lawrence River and Rideau Canal. Ottawa is served by the Canadian Pacific, the Grand Trunk, the Canadian Northern and the Ottawa and New York railways, and by the Suburban Electric road.

The city is located in a region of great beauty and is itself one of the finest cities of Canada. Among the notable buildings are the government buildings on Parliament Hill (rebuilt since the fire of 1915), the Roman Catholic Cathedral of Notre Dame, Christ Church Cathedral, Rideau Hall (the residence of the Governor-General), the city hall, the postoffice, numerous churches and the public library, or Library of Parliament, which contains over 200,000 volumes. The chief educational institutions are the Ottawa Roman Catholic University, a collegiate institute, the Ottawa Provincial Normal School and a number of private institutions.

The Ottawa River, which here forms the magnificent cataract known as the Chaudière Falls, furnishes power for numerous foundries, factories, flour mills and saw mills. The principal trade of the city is in its sawed timber, the total amount cut in the mills being hundreds of millions of feet annually. There are also manufactures of iron ware, agricultural implements, machinery, bricks and other commodities. Altogether the city has about 180 factories, employing 17,000 workmen.

A United States consul-general is located at Ottawa. The town was first settled in 1823 and was made a city, with its present name, in 1854. In 1858 it was selected as the capital of Canada. Population, 1911, 87,062; in 1916, with suburbs, about 135,000.

OTTAWA RIVER, one of the most important rivers of Canada, the chief branch of the Saint Lawrence River. With its tributaries it floats more lumber than any other water course in the world. The clearing of the timber lands has opened the way for agriculture, and the region it traverses is becoming thickly settled. Ottawa and Hull are the largest cities on its banks.

The river rises in the Laurentian highlands of Ottawa, flows westward then southeast and east, entering the Saint Lawrence through two mouths which form the island on which the city of Montreal is built. The principal tributaries are the Madawasca and Rideau on the right, and the Rivière du Lièvre and Gatineau on the left. Rideau Falls, just above Ottawa, obstruct navigation, but the river is connected with Lake Ontario by the Rideau Canal. After the completion of the Georgian Bay Canal the Ottawa River will form part of the great waterway from the Great Lakes to the Atlantic.

OTTER, a fur-bearing animal that lives in and near water. Otters are found in all parts of the world, though they exhibit considerable differences, according to locality. In general, the body and tail are long and thick, the legs small and short. The head is large and inclined toward flatness, and the eyes and

ears are small. The under fur is short, woolly and whitish-gray; covering this is a coat of long, coarse hairs, dark brown in color. Otters are expert swimmers and divers, and they live on fish. The common river otter makes

THE OTTER

a burrow in the banks of streams and lines it with grass and leaves, and here the young—usually three or four—are reared. The *American,* or *Canadian,* otter, about four feet long, including the tail, is much hunted for its fur, which is deep reddish-brown in winter and blackish-brown in summer. About 6,000 are killed in Canada annually. The dyed fur often passes as a substitute for seal (see FUR AND FUR TRADE).

Sea otters, which make their home on the coasts of the North Pacific, are comparatively rare. These animals have deep, lustrous black fur and somewhat resemble small seals. This fur is very valuable, a single perfect pelt having been known to sell for $2,000. Sea otters are timid little creatures, and are caught by shooting, clubbing or netting.

OT'TO I (1815–1867), king of Greece, son of Louis I of Bavaria. In 1832 the Greek National Assembly offered him the throne of Greece, and his reign began the following year, under a regency. On attaining his mayority in 1837 he assumed personal control, and in the same year married the German Princess Amalie of Oldenburg. Heavy taxes and German and Bavarian influence at court caused much dissatisfaction, which in 1843 brought revolution. Otto granted a constitution, but the trouble continuing, he was forced to flee the country. He never returned, though he never formerly renounced the Greek throne.

OTTUM'WA, IOWA, the county seat of Wapello County, is on both banks of the Des Moines River, about ninety miles from Des Moines and 281 miles west of Chicago. The river is crossed by three substantial iron carriage bridges and two railroad bridges. The Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Wabash and the Chicago, Milwaukee & Saint Paul railroads serve the city. There are numerous coal mines in and around Ottumwa, which furnish an abundance of coal for the railroads and for the shops and factories located here. The manufactories produce agricultural implements, steam boilers, mining tools, packed meats, bridges, cigars and candy. The largest independent meat packing establishment in the world is here. The city has a Carnegie Library, a Y. M. C. A. and a $300,000 hotel, and a United States government building. There are an academy for girls and two hospitals. Ottumwa was settled in 1849 and incorporated in 1851. The commission form of government was adopted in 1913. Population, 1910, 22,012; in 1917, 24,708 (Federal estimate).

OUACHITA, *wash'i ta,* **RIVER.** See WASHITA RIVER.

OUDH, *owd.* See UNITED PROVINCES OF AGRA AND OUDH.

OUIDA, *wé dah.* See RAMÉE, LOUISE DE LA.

OUNCE, from the Latin *uncia,* meaning a *twelfth part* of any magnitude, is the name of a unit employed in weighing. It is equivalent to one-twelfth of a pound, or 480 grains Troy weight, and one-sixteenth of a pound, or 437½ grains, avoirdupois. In the United States the apothecaries ounce is the Troy ounce; in Great Britain, the avoirdupois.

OUNCE, a beautiful animal of the cat family, called *snow leopard.* It lives in the very cold mountain regions of Central Asia. Its hair, which is very long, rough and heavy, is nearly white, marked slightly with black, and thus protected the animal is able to creep unperceived over the snow in search of its prey—goats, sheep and such small animals. It rarely attacks man. The name is often misapplied to the South American jaguar.

OUTCAULT, *out'kawlt,* RICHARD FELTON (1863–), a newspaper cartoonist, the originator of the "Yellow Kids" and "Buster Brown," familiar to most boys and girls. He was born at Lancaster, Ohio, and educated at Cincinnati. Since 1895 his drawings have been a regular feature of Sunday supplements of newspapers. Some of his characters have appeared on the stage, and nearly all the drawings have been put into book form.

OUTRAM, *oo'tram*, JAMES, Sir (1803–1863), a British general and stateman, born in Derbyshire and educated at Aberdeen. He went into service in India, and there won the unbounded admiration of his wild hill troops by his cool daring and astonishing hunting achievements. As adjutant to Sir John Keane, he took part in the Afghan War of 1838 and later helped to put down the Indian Mutiny, acquitting himself with distinction. For twenty-five years he was a conspicuous figure in affairs in India.

OUZEL, *oo'z'l*, a name formerly given to the English blackbird and to-day applied to the dipper, a bird related to the wrens and thrushes. The bird is short and squat and of a dusky color above and white beneath. It lives on aquatic insects and fresh-water mollusks, which it braves the depths of streams to capture. The young take to water before they are fully fledged. See DIPPER.

OVEN, *uv'en*, **BIRD**, in the United States, a species of thrush, which builds a domed, nest, shaped somewhat like an old-fashioned out-door oven. It is about six inches long, is olive-green above and white, streaked with black, underneath. The bird is distinguished by its sweet chattering at twilight and by its manner of walking with a seasaw motion and nodding head movement. Other species are found in South America.

OVID (43 B. C.–A. D. 18), the common name of PUBLIUS OVIDIUS NASO, a celebrated Roman poet. After receiving a careful education, completed at Athens, where he gained a thorough knowledge of the Greek language, he traveled in Asia and Sicily, then settled in Rome. There his pleasure-loving temperament and light verse won for him the friendship of a large circle at court. In the year A. D. 8 Ovid was banished from Rome to Tomi, a town on the desolate shores of the Black Sea, ostensibly for having published *Art of Love*, though in reality perhaps because he knew certain facts connected with a court love affair. In the uncongenial and semi-barbarous environment of Tomi Ovid spent the remainder of his life, in spite of repeated attempts of himself and friends to have the term of his banishment shortened.

Besides the *Art of Love*, Ovid wrote *Fastorum Libri*, a poetical calendar; *Nux*, the complaint of a nut tree over the way it is treated; *Epistolae Heroidum*, letters from heroines to their husbands; and a number of love elegies. His most famous work is the *Metamorphoses* ("Transformations"), an account of all the transformations described in legend to the time of Julius Caesar. Ovid's poetry lacks depth of feeling, and its moral tone is not high, but it lives by reason of its musical quality.

OWEN, ROBERT (1771–1858), an English social reformer, born in Wales. He was at the head of a company which bought large cotton mills at New Lanark in Wales, and the reforms which he introduced in the community made him famous throughout Europe. He believed in thorough coöperation and attempted several times to found communities based on this idea. In 1824 he visited America and founded a community at New Harmony, Ind., which, however, proved unsuccessful.

OWENSBORO, *o'enz bur o*, KY., the county seat of Daviess County, 112 miles southwest of Louisville, on the Ohio River, and on the Louisville & Nashville, the Illinois Central and the Louisville, Henderson & Saint Louis railroads. It has steamboat service to other river cities. The city is in a farming and stock-raising country, and contains valuable timber and deposits of oil, coal, clay, stone, iron, zinc and other ores. It has about fifty manufacturing establishments, including tobacco factories, woolen, flour and planing mills, a wagon and carriage factory and various other works. The Owensboro Female College and the Saint Joseph Francis Academy are located here, and there are two hospitals and a Carnegie Library. It was settled as Yellow Banks in 1798, was made the county seat in 1815 and was given its present name in honor of Colonel Abraham Owen in 1818. Population, 1910, 16,011; in 1917, 18,070 (Federal estimate).

OWEN SOUND, formerly SYDENHAM, ONT., the capital of Grey County, and a port of entry on Georgian Bay, situated at the mouth of the Sydenham River, 122 miles northwest of Toronto. It is on the Canadian Pacific and the Grand Trunk railroads. There is a well-protected harbor twelve miles long, and the city has regular steamship connection with other lake ports. In the vicinity is the largest mica mine in North America. Owen Sound has numerous manufactories producing a variety of commodities, and it owns and operates all public utilities. It is a well-known summer resort. Population, 12,612.

OWL, a small bird of prey, of which there are about 200 species. All have thick, short bodies, very strong wings, large heads and large eyes, usually surrounded by circles of radiating feathers, which, with the rather dignified movements of the birds, give them an appearance of wisdom that is not wholly justified. The plumage is soft and downy, and their flight is almost noiseless. Their legs, and even their toes, are usually feathered, though in some species they are bare. The toes are so arranged that they can be used like hands for clasping.

Most owls work and feed at night, and their eyes are especially fitted to see in the darkness. During the day owls spend their time in crevices of rocks, nooks and

SCREECH OWL GREAT HORNED OWL

crannies of old buildings or hollows of trees, and in such positions they nest, laying from two to five white eggs. When disturbed or wounded, some of them fight fiercely.

Some Species of Owls. Several different species vary greatly in size and in habits. The *great horned owl,* common to North and South America, is usually brown in color, though it varies sometimes to almost white. When in search of prey it is so quiet and rapid in its movements that it is able to cause great destruction among small wild animals and even among domestic fowls. The tufted *screech owl* is probably the most common species in the Eastern United States. It is small, harmless and best known by its shrill, unpleasant cry. In the Western United States a little *burrowing owl* lives in the home of prairie dogs, often in company with rattlesnakes, and it is supposed that the owls and snakes prey upon the young of the prairie dogs. The *snowy owls* are large and handsome birds, with pure white plumage. They hunt by day and are fearless in their attacks on birds as large as ducks and partridges. They are found in the cold regions of both hemispheres. The *long-eared owl* appears in the woods of both hemispheres; and the *short-eared owl,* living in more open places, is also found over a very wide territory.

The "little owl," most commonly mentioned in literature, is the one whose note is *to-whit, to-who.* This, too, is the bird sacred to Minerva and still regarded as the symbol of wisdom. In olden times, owls were considered birds of ill omen, and they are still regarded by some with superstition among uneducated people.

OWOS'SO, MICH., in Shiawassee County, twenty-six miles northeast of Lansing, on the Shiawassee River and on the Grand Trunk, the Michigan Central and the Ann Arbor railroads. There is also interurban service. It is in an agricultural region and contains manufactories of furniture, caskets, malleable iron, boilers, screen doors and windows, cars, beet sugar and various other products. The city has a business college, a Carnegie Library, a Federal building and four hospitals. It was settled in 1836, and was chartered as a city in 1859. The commission form of government was adopted in 1913. Population, 1910, 9,639; in 1917, 10,326 (Federal estimate).

OXAL'IC ACID, an acid which occurs, combined sometimes with potassium or sodium, at other times with calcium, in wood sorrel and other plants and in minute quantities in the fluids and tissues of the animal body. Many processes of oxidation of organic bodies produce this substance. Thus, sugar, starch and cellulose yield oxalic acid when fused with caustic potash or when treated with strong nitric acid. Oxalic acid is a solid substance which crystallizes in four-sided prisms, the sides of which are alternately broad and narrow, and the summits, two-sided. They are efflorescent in dry air, but attract a little humidity if it be damp. They are soluble in water, and their acidity is so great that, when they are dissolved in 3,600 times their weight of water, the solution reddens litmus paper and is acid to the taste.

Oxalic acid is used extensively in industry. It is a deadly poison, and its use by mistake for epsom salts (which it resembles) has had fatal results. Chalk milk and solutions of lime are antidotes. *Oxalates* are compounds of oxalic acid with bases; one of them, binoxalate of potash, is well known as salts of sorrel or salts of lemon. The oxalate of lime is an important agent in medicine.

OXFORD, England, the home of a celebrated university, is a city and Parliamentary borough and the county seat of Oxfordshire. It is situated at the junction of the Thames (here called the Isis), and the Cherwell, fifty miles northwest of London. It is built on a low plain, surrounded by hills and extended by many beautiful suburban districts. High Street, which houses several of the colleges of the University of Oxford (which see), is one of the finest thoroughfares of all England. The oldest building is the castle keep, built in the time of William the Conqueror. Because of its many beautiful churches, notably Saint Mary's, Saint Michael's and Saint Peter's, Oxford is also known as the *Cathedral City*.

Oxford is first mentioned in history in the tenth century, although there is evidence that it was in existence somewhat earlier than this. During the Middle Ages it occupied a place of considerable importance. One of the famous occurrences in its history was the assembling, in 1258, of the Parliament which passed the Provisions of Oxford. The university was founded about the twelfth century. During the struggle of Charles I with Parliament, Oxford was the center of the Royalist movement. Although the city was besieged by the army of Parliament, it was not bombarded, and its famous buildings thus escaped destruction. Population, 1914, 53,980. See Oxford University.

OXFORD MOVEMENT, an important movement in the Church of England, so called because it started in Oxford. It occurred in the first half of the nineteenth century, and represented an effort to restore to the English Church the spiritual glow and fervor that had animated it in the seventeenth century. Religious thought and life in England had become cold and mechanical, a condition that alarmed some of the more spiritual of the clergy. In July, 1833, John Keble gave the movement definite form by preaching in Saint Mary's Church, Oxford, a sermon on *National Apostasy*. About the same time friends of the cause began publishing a series of *Tracts for the Times*, which had wide influence. Of the clergymen whose active interest was enlisted, the most notable was John Henry Newman. After a time the Tractarians, as they came to be known, began differing among themselves, and a small body, including Newman, went over to the Roman Catholic Church. Newman's secession, in 1845, marks the close of the agitation as a definite movement, but its influence was by no means checked. It caused a revival of interest in religion, and the High Church movement of the present day is a direct result of it.

OXFORD UNIVERSITY, one of the most important universities in the world, and the oldest in England. It is located in Oxford, a beautiful old town on the Thames, about fifty-five miles from London. Its history dates back to the twelfth century, but the present plan of organization originated about 1250. This great university is a union of more than a score of men's colleges, at the head of which are officials known as warden, provost, principal, president or master. There are two halls for women (Lady Margaret and Somerville), but women are not permitted to take degrees, though they may attend lectures. Among the more notable men's colleges are Balliol, Christ Church, Trinity, University and Exeter.

Certain students in each college are elected to fellowships after their graduation, and they then take a very important part in the college life, teaching, aiding in the school management and carrying on postgraduate studies. Undergraduates are directed by tutors, who maintain close personal relations with them. Class sessions are devoted to lectures instead of recitations, and students are required to do an extensive amount of reading and to take examinations which are conducted by the university organization. There is a comprehensive system whereby superior students receive special honors. All degrees are based upon examinations. Athletic, debating and literary societies are an important feature of college life. Every undergraduate is expected to take an active part in athletics.

Oxford is of especial interest to American students, because of the provision in the will of Cecil Rhodes, by virtue of which two students from every state are given support, to

the amount of $1,500 a year each, for completing courses in the university. During the World War the university lost the majority of its students, but in normal years the undergraduate enrollment is about 3,000, while the faculty numbers 300. See RHODES SCHOLARSHIPS.

OXIDATION, *ok si da'shun.* When a chemical compound or an element is combined with oxygen, the process by which the two are united is called *oxidation.* The substance formed by such a combination is called an *oxide.* An oxide containing one, two or three atoms of oxygen is called a nonoxide, dioxide or trioxide. Oxides are among the most important compounds of which chemistry treats. Ordinary combustion, or burning, is a process involving oxidation, in which substances combine with oxygen and are seemingly destroyed.

OXYGEN, the gas that enables animals to live, plants to grow and fire to burn, is the most abundant of all substances. It forms by volume one-fifth of the air, by weight eight-ninths of water; combined with silicon and other substances it forms nearly half the earth's crust, and compounds of oxygen form a large part of animal and vegetable matter.

Oxygen is a gas, without color, odor or taste. It is a little heavier than air, and is slightly soluble in water, but the small quantity absorbed is of great importance, for without it fish could not live and the oxygen in running water helps keep it free from animal and vegetable matter. Oxygen is exceedingly active, and combines with all other elements, except fluorine, bromine, and some rare gases.

Experiments. Pure oxygen can be obtained by heating a mixture of black oxide of manganese and potassium chlorate in a flask and collecting the gas in jars inverted over water. Since the gas is heavier than air it will remain for a short time in a jar if the mouth is covered. Then the following experiments can be readily performed:

1. Attach a match to a wire. Light the match and place it in the oxygen. It will burn much more brilliantly than in air.

2. Place burning sulphur in a jar of oxygen and notice the brightness of the flame.

3. Dip the end of a wire or an old watch spring in sulphur. Light the sulphur and place the wire in a jar of oxygen; the wire will burn, throwing off brilliant sparks, and a slight coat of iron rust (oxide iron) will form on the inside of the jar.

Oxidation and Combustion. The slow combination of oxygen with other substances is called *oxidation,* and the products formed are *oxides.* The rusting of iron is a good illustration of oxidation. But when the union is so rapid as to be accompanied with light and heat, the process is called *combustion,* as in the burning of wood and coal. The same products are formed in each case and the same amount of heat is given off, only in case of oxidation the process is so slow that the heat is imperceptible. That is, as much heat will be produced in the rusting out of an iron wire as in burning it in a jar of oxygen, but the rusting may be extended over years, while the burning requires less than a minute.

How Oxygen Supports Life. Neither animals nor plants can live without air. In respiration a portion of the oxygen in the air that enters the lungs reaches the blood and purifies it. The purified blood then enters the arteries and circulates through the body, rebuilding the tissues. When the blood enters the lungs it is of a dark, purplish-red color; when it leaves them, purified by the oxygen, it is a bright red. Moreover, through the union of the oxygen with the tissues, or oxidation, the heat which maintains the temperature of the body is developed. One of the waste products formed during this process is carbon dioxide, which is given off through the lungs.

Plants, on the other hand, absorb carbon dioxide through their leaves and give off oxygen, but this process goes on only under direct sunlight.

Uses of Oxygen. Under great pressure oxygen is changed to a liquid, which is stored in strong steel cylinders for commercial uses. When mixed with hydrogen in proportion of two parts oxygen to one part hydrogen and burned in a tube with a small opening, it produces an intensely hot flame, and is used in blowpipes, producing a flame so hot that it easily cuts steel. Oxygen is used in acetylene welding, and in medicine to restore patients who are partially suffocated. It is also employed in severe cases of pneumonia. For commercial purposes it is obtained from liquid air.

History. Oxygen was discovered in 1774 by Priestley who named it *dephlogisticated air,* because he thought it did not possess the principle of phlogiston; in other words, because it would not burn. Another chemist, Scheele, rediscovered it and named it *oxygen,*

a name meaning *acid-former,* because he thought it was an ingredient of all acids.

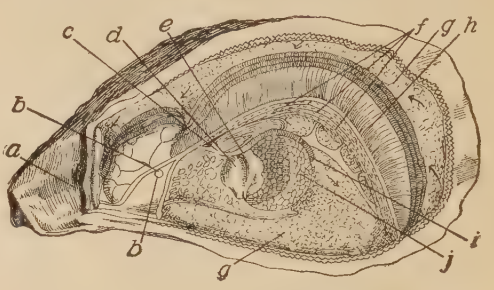
OXYGENATED, *oks'i jen a ted,* **WATER.** See Hydrogen Dioxide.

OXYHYDROGEN LIGHT. See Lime Light.

OYAMA, *o yah'mah,* Iwao, Prince (1842–), field marshal of the Japanese army. He was born in Satsuma, and during his youth had for a tutor Saigo Nanshu, a relative, one of the greatest military geniuses of Japan. In the Japanese war of restoration, in 1868, when the forces of the emperor fought against those of the Shogun for the restoration of the sovereign power to the emperor, Oyama fought under Saigo for the emperor, but in the civil war some ten years later, when Saigo, with other Satsuma men, revolted against the emperor, Oyama stayed with the imperial forces, and at the head of a division of troops he succeeded by brilliant skill and courage in bringing victory to the army of the emperor. His later positions were chief of police, associate minister of the interior, vice-minister of war and minister of war. In 1884 he was appointed chief of the general staff, and in the war between China and Japan he was in command of the second army. In the Russo-Japanese War, in which he served as chief of the Manchurian army, Oyama won distinction and gave evidence of great strategical and engineering genius. He received the British Order of Merit in 1906, and a year later was awarded the title of prince.

OYSTER, a salt-water mollusk, highly esteemed as an article of food. Of all classes of marine animals valued as fishery products, oysters are the most important. The oyster consists of a soft body enclosed in a rough shell of two valves, the under one being larger than the upper. Food is taken into the body through a funnel-shaped opening, or mouth, at the narrow end of the body, and is assimilated by a central stomach attached to the mouth by a tube. A fold of muscle known as a mantle lines the shell, the valves of which are held together by a strong muscle.

Oysters are propagated by eggs. These are so minute that they appear like a milky fluid in the water. The young oysters are for a time able to move about, but as they develop, they attach themselves to some hard, smooth object, where they remain during life. A number attach themselves to one another, sometimes forming large masses, with distorted shells. The oyster is found in the Atlantic, off the coasts of America and Europe, in temperate latitudes. It prefers rather



ANATOMY OF THE OYSTER

a—Hinge.
b—Ganglia of the nervous system.
c—Blood-vessel from gills to auricle of heart.
d—Ventricle.
e—Auricle.
f—Pores from which water issues into bronchial canals after passing through gills.
g—Mantle (arrows show direction of current produced by cilia).
h—Gills.
i—Outline of organ of Bojanus, the so-called kidney.
j—Adductor muscle.

shallow water, with a smooth, sloping bed of gravel or mud, in a location where the tide washes in upon it the minute plant and animal organisms that constitute its food.

Because of their delicate flavor and nutritive qualities, oysters are highly valued as food. In the United States oyster fishing is an important industry in Chesapeake Bay, where the oysters are found in largest numbers, and at various other places along the Atlantic coast as far north as Maine. The natural beds have been nearly exhausted, and *oyster farming,* or oyster culture, is now a well-established occupation in many localities. A suitable place for a bed is selected and cleared of rocks or other objects which would interfere with the growth and gathering of the oysters. This is then marked by buoys and stocked with young, or "seed," oysters obtained from other beds. After stocking, the bed requires very little attention. The oysters attain their growth in about three years. They are usually obtained by dredging, which consists of dragging the bed with an iron rake that detaches the oysters from the bottom and collects them.

Oysters are placed on the market in the shell, in bulk and in cans. The canning is usually done near the place where the oysters are grown. Bulk oysters are taken from the shell immediately after they are drawn from the water and are shipped in pails containing ice. When shipped in the shell, the shells

are packed in boxes of ice, since the oyster must be kept cool or it soon loses its flavor.

OYSTER CATCHER, a long-legged wading bird having an extended, sharp-edged, wedge-pointed bill, which it uses for opening

OYSTER CATCHER

clams, oysters and other mollusks, on which it feeds. The bird is a strong flier and an expert diver. It builds no nest, but lays its eggs, which are buff, marked with brown, and usually three or four in number, on the ground. One species is found on both coasts of the American continents. It is about twenty inches long, has brown plumage above and white beneath, and black head and neck. The European species has handsomely variegated black and white plumage resembling that of a magpie.

OYSTER PLANT, or **SAL'SIFY**, a plant cultivated for its edible root, which has a flavor somewhat like that of oysters. The plant, a native of Europe, thrives in almost any temperate climate, and is much cultivated in the United States, though it has not the commercial importance of either carrots or parsnips. The second season it produces flower stalks three or four feet high, capped with purplish blossoms. The tapering roots are from eight to twelve inches long and about two inches in diameter at the top. Like parsnips, the roots are better if left in the ground in winter.

OZAKA, *o sah'ka*. See OSAKA.

OZARK, *o'zahrk*, **MOUNTAINS**, a chain of hills occupying Southern Missouri, Northern Arkansas and parts of Oklahoma. These are among the oldest mountains in the world. They were once lofty, but have been worn away in course of the ages until now only separate peaks or domes are standing. The highest of these, about 2,000 feet, are the most southern, and are heavily wooded. The hills contain rich deposits of coal, lead and iron. South of the Arkansas River the elevation is known as the Ouichita Mountains.

O'ZONE, a colorless gas, with an odor resembling that of weak chlorine. It is a modified form of oxygen, in which three volumes of oxygen are condensed to two. Ozone exists in small quantities in pure country air and is produced in various ways. When an electric machine is set in operation or a lightning discharge occurs, the peculiar smell of ozone may be noticed. Ozone acts as a very powerful oxidizer; for this reason it is of great service in the atmosphere, as it renders comparatively harmless the dangerous and obnoxious products of animal or vegetable putrefaction. Ozone rapidly bleaches indigo, converting it into a white substance called isatin, which contains more oxygen than the indigo itself.

P, the sixteenth letter in the English alphabet, has varied considerably in form from its Phoenician original, the greatest change taking place in the transition from Greek to Latin, when the short perpendicular limb was bent around to join the longer. In all of these languages, however, it stood for the same sound, which it still retains in English. At the beginning of a few words, as *psalm,* and before *t* in a few words, as *receipt, p* is silent. It forms a part of one diagraph, *ph,* which has the same sound as *f.*

The most important use of *P* as an abbreviation is for the Latin *post,* in such expressions as P. M., afternoon, P. S., postscript.

PACHYDERM, *pak'i derm,* a group of mammals characterized by having a thick skin. The group includes the elephant, the hippopotamus, the rhinoceros, the tapir and the hog. The name is no longer in scientific use, but the terms *pachyderm* and *thick-skinned* are frequently employed in human affairs to denote lack of sensitiveness.

PACIFIC OCEAN, *pa sif'ik,* that immense expanse of water which extends between the North and South American continents and Asia and Australia. It is the largest of the oceans, exceeding in compass the whole of the four continents taken together, and occupying more than a fourth part of the earth's area and fully one-half of its water surface. Its greatest extent east and west, 10,000 miles, is along the equator; its greatest length from north to south is 7,350 miles, and its area is estimated to be 70,000,000 square miles. The average depth is about 15 180 feet, or 2,530 fathoms. The greatest depth so far discovered is near Mindanao, one of the Philippines, where the soundings show a depth of over six miles, or 32.088 feet. There are seven other places where the depth exceeds 30,000 feet. The currents of the Pacific are similar to those of the Atlantic, but they are on a larger scale. The Japan Current, sometimes called the *Kuro Siwo,* corresponds to the Gulf Stream, and in the South Pacific the Humboldt Current, which flows along the west coast of South America, corresponds to the Benguela Current of West Africa.

The trade winds are less regular than in the Atlantic, especially in the South Pacific, where the numerous groups of islands disturb the regularity of atmospheric pressure. Typhoons are of frequent occurrence in the China Sea. The American shore line is comparatively regular, having only one deep indentation, the Gulf of California, but the Asiatic shore is more irregular. Among the largest indentations are the China Sea, the Yellow Sea, the Japan Sea and the Okhotsk Sea.

The Portuguese were the first Europeans who entered the Pacific. Balboa, in 1513, discovered it from the summit of the mountains which traverse the Isthmus of Darien, or Panama. Magellan sailed across it from east to west in 1520–1521. Drake, Tasman, Bering, Anson, Byron, Bougainville, Cook, Vancouver, Lapérous and others traversed it in different directions in the seventeenth and eighteenth centuries. The name, meaning *peaceful,* was given the ocean by Magellan, who had a pleasant voyage across it, but the Pacific has as severe storms as the Atlantic. See OCEAN; OCEAN CURRENTS.

PADDLEFISH, a large fish allied to the sturgeons, so named from its long, broad, paddle-shaped snout, with which it stirs up soft, muddy water-bottoms in search of food. Its average length is about three feet, and its weight is about thirty pounds, but specimens weighing 150 pounds have been caught. The skin is greenish and is without scales. The flesh is smoked and the roe is made into

caviar. These fish are found in most large bodies of fresh water.

PADEREWSKI, *pah de ref'ski,* IGNACE JAN (1860–), a Polish musician who after gaining worldwide fame as a pianist abandoned his artistic career for that of a Polish patriot and statesman. During the World War he devoted his entire time to raising relief funds for his suffering countrymen, and when the defeat of the Germanic alliance assured the rise of a redeemed Poland, he stood out as a leading figure in the new nation, becoming Premier and Foreign Minister of the provisional republic (see POLAND).

PADEREWSKI

Paderewski was born in Podolia, Russian Poland. He studied at Warsaw and at Berlin, was made a professor of music in the Warsaw Conservatory at the age of eighteen, and a few years later was offered a similar position in the Conservatory of Strassburg. Later he went to Berlin for further study, and afterwards became an advanced pupil under Leschetizky. In 1887 he made his formal début in Vienna, and three years later created a name for himself in London by brilliant performances. His successes were repeated in America, where he received such ovations as had rarely, if ever, been accorded a pianist. In 1889 Paderewski married Baroness de Rosen. His several published compositions have not received the enthusiastic approval of critics, though some of his piano pieces are of a high order. His compositions include an opera, *Manru,* a symphony, a concerto, a trio, a piano sonata, a sonata for piano and violin and a famous *Minuet.*

PAD'UA, ITALY, one of the most interesting cities of the kingdom, and capital of the province of the same name, is situated on the Bacchiglione River, twenty-two miles southwest of Venice, with which it is connected by rail. The river flows through the city in several branches and is crossed by numerous bridges. The houses are lofty, the streets narrow and crooked; and several of them, as well as some of the squares, are lined with medieval arcades. Within recent years the city has been much improved by the opening up of new streets and the widening of old ones.

The notable buildings include the cathedral, which dates from the sixteenth century; the Palazzo della Ragione; the large, mosquelike Church of San Antonio; the municipal picture gallery; the episcopal palace, and many private palaces. The university was long renowned as the center of law and medicine in Italy and was one of the most famous of European universities, in medieval times. Among its famous lecturers was the astronomer Galileo. The city was the birthplace of Livy.

Under the Romans Padua was a flourishing town, and its history is similar to that of most of the cities of Italy after the decline and fall of the Roman Empire. Latterly it was under the rule of Venice, whose fortunes it shared until 1866, when with Venice it became part of the kingdom of Italy. At present the place has considerable manufacturing importance and a prosperous local trade. Population, 1915, of city and suburbs, estimated at 105,135.

PADU'CAH, KY., the county seat of McCracken County, eighty miles southwest of Evansville, Ind., at the confluence of the Ohio and Tennessee rivers, on the Illinois Central, the Nashville, Chattanooga & Saint Louis and the Chicago, Burlington & Quincy railroads. The city is in an agricultural, lumbering and mining region and contains over fifty factories. The principal products are cotton rope, tobacco, veneering and other lumber products, wagons, pottery, flour and various other articles. It has railroad shops, and steamboats are also constructed. There are good shipping facilities, both by rail and water. A new double-track bridge over the Ohio River contains a single span 720 feet long—the longest ever constructed. The principal structures include a fine high school building, a large city hall, a Federal building, a county courthouse, two hospitals and a Carnegie Library. The place was settled in 1827, and was chartered as a city in 1856. The commission form of government was adopted in 1913. Population, 1910, 22,760; in 1917, 25,178 (Federal estimate).

PAGANINI, *pah ga ne'ne,* NICCOLO (1784–1840), a celebrated violinist, perhaps the greatest master of violin technic the world has ever seen. He was born at Genoa, Italy, and had for teachers some of the foremost

masters of that city. He is said to have composed a sonata at the age of eight and the next year to have made his first public appearance in concert. When he had learned all the best teachers of the day had to give him, he began a rigorous course of self-training, often practicing fifteen hours a day. On his concert tours he played before audiences who fairly went wild with enthusiasm, some listeners declaring he performed feats of magic with the devil's aid.

At the age of sixteen he became independent of his family, and, all restraining influence removed, his lack of balance became evident in gambling and other excesses. He made great sums of money with his playing, much of which he lost. Throughout life his unbalanced character manifested itself in loose morals and love of coarse pleasure. Paganini left a considerable number of compositions for stringed instruments, chiefly for the violin. The instrument on which he played, a very fine Guarneri, he bequeathed to the town of Genoa, where it is preserved in a museum.

PAGE, Thomas Nelson (1853–), an American novelist and short-story writer, born at Oakland, Va. He was graduated from Washington and Lee University and from the University of Virginia Law School. After practicing law for eighteen years he moved to Washington, D. C., and thenceforth devoted himself to literature. Honorary degrees have been conferred on him by several universities, and he is a member of the American Academy of Arts and Letters. In 1913 he was appointed United States ambassador to Italy, and served conspicuously in this difficult post during the World War.

THOMAS NELSON PAGE

His novels and stories deal almost exclusively with southern characters. The best-known of his novels are *Red Rock, Gordon Keith, John Marvel, Assistant, Bred in the Bone, The Land of the Spirit* and *The Stranger's Pew.* The volume *In Old Virginia* contains the incomparable stories, *Marse Chan, Meh Lady* and others. Page has written many essays and poems and several biographical studies.

PAGE, Walter Hines (1855–1918), American journalist and diplomatist, born at Cary, North Carolina. He spent four years at Randolph-Macon College, and later two years at Johns Hopkins. He then engaged in newspaper work for twelve years, part of the time as a special writer, for a short time as editorial writer on the New York *World,* and later as editor of a paper of his own in Raleigh, N. C. In 1890 he became editor of *The Forum,* which he conducted for five years. He was then in turn literary adviser for Houghton Mifflin & Co., and editor of the *Atlantic Monthly.* In 1890 he became a member of the firm of Doubleday, Page & Company and one of the founders of the *World's Work,* which he edited for twelve years, when he resigned his position to become ambassador to great Britain. In this position during the trying period of the World War, Page fully sustained the reputation of his country, and by his sound judgment and common sense greatly endeared himself to the British people. He resigned in October, 1918, because of ill health, and returned to the United States, where he died December 22. His death was in a measure due to overwork.

PAGEANT, *paj'ent,* or *pa'jent,* a term defining a dramatic representation of a number of scenes, either tableaus or miniature dramas. In Europe the pageant has been in vogue for centuries, but in America its popularity is of recent date. It affords excellent opportunity for giving vital instruction in history, art, literature, science and industry. Simple scenes representing single events can be given in almost any school or home with a little ingenuity on part of the teacher or mother. Inexpensive material will answer every purpose, and often much of the material needed will be found in the pupils' homes. The great value of the pageant in education lies in the fact that it appeals to instincts that are universal in humanity. All classes—children, youth and manhood—take delight in such representations, and are ready to lend their aid to any reasonable plans presented.

In its nature and methods it is much to be preferred to the plays, fairs and exhibitions often given. Pupils live in the scenes they are rendering or witnessing. Imagination is quickened. The process is constructive, not analytical, because the appeal is to all the faculties.

The following works are inexpensive and will be found helpful to those desiring to give pageants. Bates and Orr's *Pageants and Pageantry;* Constance Darcy Macey's *Costumes and Scenery for Amateurs;* Thorp and Kimball's *Patriotic Pageants of To-Day.*

PAGO'DA, a towerlike building, common in India and the Far East, used by Buddhists for religious purposes. In India the pagoda is sometimes a pyramidal structure placed over the gateway or inner shrine of the temple; again it may be an independent building. The Hindu pagodas are among the most magnificent buildings in the world. In China pagodas are exceedingly numerous. There, too, they frequently are independent buildings—towers where sacred relics are kept. Commonly the Chinese pagoda is a many-sided building of numerous stories, with an encircling veranda at each story. The roofs of these verandas, and likewise the eavelike projections, are curved, and give to the building a distinctive contour. Most of these towers are of brick. The Japanese pagoda, commonly an adjunct of a temple, is built of wood, on account of the frequent occurrence of earthquakes in Japan.

PAINE, Thomas (1737–1809), a political and philosophical writer, born in England. In 1774 he emigrated to America and threw himself heart and soul into the cause of the colonists. His pamphlets entitled *Common Sense,* written to recommend the separation of the colonies from Great Britain, and *The Crisis,* published during the Revolutionary War, made him prominent. In 1787 he traveled in Europe and while there wrote, in answer to Burke's *Reflections upon the Revolution in France,* the *Rights of Man,* in which he attacked Burke and criticized the English Constitution. To escape the hostility this provoked, he went to France and was chosen a member of the French National Convention for the department of Calais. On the trial of Louis XVI he voted against the sentence of death. This offended the Jacobins, and toward the close of 1793 he was arrested and escaped the guillotine only by an accident. He remained in France till August, 1802, and then embarked for America, where he spent the remainder of his life. Just before his confinement he had finished the first part of *Age of Reason,* a book ridiculing the religion that draws its inspiration from the Bible. This work, once widely read, no longer withstands scholarly criticism.

PAINT, a mixture of a coloring substance with a liquid—oil, glue or water, and used for protection and for ornamentation. That is, we paint our houses on the outside to protect them from the weather, and on the inside to make them more beautiful. The coloring matter in a paint is the *pigment,* and the fluid with which it is mixed is the vehicle. A *drier,* usually some compound of manganese, is often mixed with the other ingredients. If a paint mixed with oil is too thick it is readily thinned by the addition of a little turpentine. The essential qualities of a good paint are permanency of color and adherence to the surface to which it is applied.

Oil paints are those mixed in oil; *water colors* are paints having the coloring matter mixed in water, to which a small quantity of glue is added to make the paint adhesive. *Mineral paints* are those whose pigments are mineral substances, such as ochre and umber. *Metallic paints* contain a metallic base, such as white lead (which see) and zinc white. They are the most durable of all paints.

Luminous Paint. Luminous paints contain a compound of phosphorus and are used for illuminating clock dials, street signs, buoys, and other objects that need to be seen at night. After being exposed for a time to light the paint will be luminous for many hours in the dark. Anyone can make luminous paint for use on paper by dissolving ten parts by weight of pure gelatin in forty parts of hot water and adding one part glycerin and thirty parts phosphorescent powder. A surface covered with this paint should be protected by varnish.

PAINTING, one of the three major arts of design, the others being sculpture and architecture. Painting is the art of representing on a flat surface, by means of color, objects in nature. The poet Browning, in his *Fra Lippo Lippi,* says:

We're made so that we love
First when we see them painted, things we have passed
Perhaps a hundred times nor cared to see.
And so they're better, painted—better to us,
Which is the same thing. Art was given for that.

None of the fine arts has done more to develop in man the love of beauty than has painting, which Ruskin called "a noble and expressive language."

Classification. Considered in relation to the subjects treated, painting may be divided into decorative; historical; portrait; *genre*, representing scenes of common or domestic life; landscape, with seascape; architectural, and still life, in the last of which are represented inanimate groups, such as vases or fruits. According to the methods employed in the practice of the art, it is termed oil, water color, fresco, tempera or distemper, and enamel painting. Decorative works, usually in fresco or tempera, but sometimes in oil, are generally executed upon the walls, ceilings or other parts of a building. Up to the fourteenth century ordinary paintings in both oil and tempera were generally made on wood panels, prepared with a coating of size and white, and these are still sparingly employed; but tightly stretched canvas, covered with a priming of size and white lead, is now almost universally adopted as a surface for oil painting. For water colors, paper alone is employed.

Oil colors are colors ground with oil, and *water colors* are those wherein gum and glycerine have been used. Both are ground solid, oil being used in the first case and water in the second to thin out the colors when on the palette. Fresco painting is executed on wet plaster. In tempera the colors are mixed with white; in encaustic, wax is the medium employed, and in enamel the colors are fired. Egyptian, Greek and early Roman paintings were executed in tempera; Byzantine art found its chief expression in mosaics, though tempera panels were executed and early Christian art up to and partly including the fourteenth century adopted this last method. The substance employed in mixing the colors was a mixture of gum and white of egg, or the expressed juice of fig tree shoots. The introduction of oil painting was long attributed to the Van Eycks of Bruges (1380–1441), but painting in oil is known to have been practiced at a much earlier period, and it is now generally held that the invention of the Van Eycks was a drying substance with which to mix or thin their colors.

Ancient Period. Painting first comes into historical notice in Egypt in the nineteenth century B. C., but the most flourishing period was between 1400 B. C. and 525 B. C. With the Egyptians the art was the offspring of religion and was, with sculpture, from which it cannot be separated, subordinate to architecture. The paintings are found chiefly on the walls of tombs and temples, but they are also on mummy cases and rolls of papyrus. They consist chiefly of the representation of public events, sacrificial observances and the affairs of everyday life. No attempt was made to imitate nature, and the work was executed according to strict rules, under the supervision of the priesthood. The paintings were usually not flat, but in low relief or slightly sunk. The artists showed no knowledge of perspective, but produced natural and lifelike pictures. The colors used are very simple, but the effect is often harmonious and beautiful.

The Greeks had a pretty legend about the beginning of drawing and painting in their country. A girl whose lover was going away, and who was brokenhearted at losing him, saw his shadow cast upon a wall and drew a line about it, that she might have the semblance of him with her always.

Painting never grew to the importance in Greece that sculpture attained, but it assumed two characteristic forms, besides the painting of pictures. These were the decoration of vases and the coloring of statues. Great numbers of vases have been found, mostly in tombs, and these give us a very clear idea of what the vase painting was. Some of the figures on the earliest, crudest vases are simply outlines of men and of animals roughly drawn, showing little lifelikeness. Later the art grew, and some of the vases which are decorated with pictures representing stories from mythology are really exquisite.

It is only comparatively recently that it has been known that the Greeks used to color their statues. From most of the recovered sculpture the coloring has worn off, and thus the finders have always taken it for granted that white was the original color. It was not the common practice, apparently, to use a flesh color on the statues, though rare examples of that have been found; but the hair and lips and eyes and clothing were painted. Care was not always taken to make the colors lifelike; horses were sometimes made blue, and lions red.

We possess almost no fragments of Greek pictures but ancient writers have left assurance that the Greek painters were mas-

ters of form, composition, color, light and shade, and perspective. An old story, which is interesting even if not true, is told of a contest between Zeuxis and Parrhasius. The one who painted the most lifelike picture was to have a prize. When the judges had gathered, Zeuxis presented his painting—a beautiful bunch of grapes. So lifelike were they that the birds came and tried to eat them, and the judges exclaimed "Zeuxis has won! He has deceived the birds." But Parrhasius advanced to show his picture, which was apparently covered by a curtain. "Withdraw the veil," said Zeuxis, "that we may see the picture." But when he reached out to touch it, he found that the curtain was the picture, and the judges awarded the prize to Parrhasius, who had deceived even his competitor.

Rome never had in ancient times an art that was its own or produced a painter worthy of note. The conquest of Greece by the Romans brought an influx of Greek artists into Italy, and it was by their hands that the principal works of Roman art were produced. A number of specimens of ancient paintings, chiefly in fresco and mosaic, have been discovered in the tombs and baths of Rome, at Pompeii and at other places in Italy. During the first three centuries after Christ, painting under the new influence of Christianity was practiced secretly in the catacombs (see CATACOMBS). But with the establishment of Christianity, by Constantine, as the religion of the state, Christian art was permitted to emerge and was allowed to adorn its own churches in its own way. Later there were many limitations and rigid requirements which fettered the artists, and the result was that art declined, until, with the flood of barbarism which in the seventh century buried Italian civilization, the art of Christian Rome was practically extinguished.

Meanwhile, with the establishment at Byzantium of the Roman capital, in A. D. 330, a Byzantine school of art had been steadily growing. At Byzantium, art had become Christian sooner and more entirely than at Rome. Like the art of ancient Egypt, however, it had grown, under the strict influence of the priesthood, mechanical and conventional, but was yet strong enough to send artists and teachers through southern Europe. All the Byzantine decorations are in mosaic and are noteworthy for the splendor of their gilded backgrounds and for their grandeur of conception, though the figure drawing is weak, with no attempt at pure beauty.

Development of Painting in Italy. In Italy the painters could not at once free themselves from the Byzantine tradition which compelled one painter to follow in the steps of his predecessor without referring to nature; and so this style was carried on in Italy by Byzantine artists and their Italian imitators up to the middle of the thirteenth century. The breaking through of this tradition and the great progress made by the arts in the thirteenth century, form the beginning of a movement which has been termed the Renaissance or Revival (see RENAISSANCE). Three cities of Italy, namely, Siena, Pisa and Florence, share the honors of this revival, each boasting a school, and each possesses two or three great names. The most important of these painters who showed a marked departure from the Byzantine manner was Giovanni Cimabue, who may be said to be the father of modern painting. Cimabue was the first to give individual life, grace and movement to figures. He made the draperies less rigid and showed a naturalism which was entirely lacking before his time.

The story goes that once as he was walking in the mountains, he saw sitting on the ground while his sheep rested around him a shepherd boy. The boy had in his hand a piece of slate, upon which he was scratching with a lump of coal. Cimabue, always interested in anything relating to drawing, approached and examined what the boy was doing, and found that he had drawn a lamb, very like those which lay about him. Much impressed, Cimabue begged for and obtained permission to take the boy to his studio and train him as his pupil. This shepherd boy was Giotto, the first great modern painter. He understood by no means all which painters who followed him regarded as the great principles of art; for instance, he knew little about perspective. But the people he painted looked like real people, with feelings and intelligence.

Filippo Lippi. It seems that each great painter added something which brought the art of painting nearer and nearer perfection. Thus Fra Filippo Lippi, though he by no means equaled some of his predecessors in composition, excelled in the treatment of single figures and in costumes. Whether he was painting saints or Madonnas he used as his models just the people he passed on the street every day, making no changes even in their costumes. His people are human and

strong, and when a picture is supposed to look like a loving mother it looks like one. Filippo Lippi was an interesting character. Left an orphan, he was taken to a convent and brought up there, and in 1421 he became a monk. He was never, however, a monk in anything but outward forms.

Botticelli. Filippo Lippi's most famous pupil was Botticelli, who possessed much of his master's vigor, with a tenderness and a daintiness that the older painter had not had. All of his pictures are a little sad, as if the artist were unable to associate perfect beauty with radiant happiness.

Leonardo da Vinci. One of the most extraordinary men who ever lived was Leonardo da Vinci, who was born in 1452. He was unusually handsome and graceful, strong and active, and so winning in his manner that everybody loved him. He loved all living things, and stories are told of how the birds used to perch on his shoulder without fear. Besides possessing all of these attractive characteristics, he had talents which would have made half a dozen men famous. He was one of the greatest painters that the world has ever seen, he was a sculptor, an engineer, an architect, a scientific investigator, an inventor. One of the things which strikes a person first about his paintings is that they look modern. Filippo Lippi's and Botticelli's pictures, beautiful as they are, look a little strange to our eyes, we need to familiarize ourselves with them before we see their beauties. But Leonardo's have nothing "old-fashioned" about them.

His most famous painting, considered by critics one of the twelve greatest paintings of the world, is the "Last Supper." This was painted on the wall of a church at Milan, and as the wall was plastered, and the material used was distemper, the wonderful picture scaled and faded until little of its beauty remained. Just of late, however, some very skilful work has been done toward restoring the picture, and if the scaling and fading can be prevented in the future the people will have a chance to see the masterpiece in something like its original beauty. Leonardo da Vinci spent four years in the production of this painting, and to everyone who knows it it has seemed unnecessary for any other painter, no matter how great, to attempt the same subject. Christ has just said to his disciples, "One of you shall betray me," and they have broken up into excited groups.

Another great picture of Leonardo's is the "Mona Lisa." This is a portrait of the wife of a Florentine man named Del Giocondo, and the picture, regarded as the greatest portrait ever painted, is often called "La Gioconda." The hands are very beautiful, and the face, while not beautiful has a wonderful, inscrutable smile, which makes it always mysterious and interesting. While painting the portait, on which he worked at intervals for four years, Leonardo had music played, that the rapt expression might not fade from the face of the lady. The "Mona Lisa" was sold to Francis I of France for four thousand gold florins, and is one of the chief glories of the Louvre.

Andrea del Sarto. Another interesting Italian artist was Andrea del Sarto, known as the "Faultless Painter." Browning has a wonderful poem, a dramatic monologue supposed to have been spoken by Andrea, in which we see what he himself regarded as the great failing of his art—the lack of soul.

Michelangelo. (1475–1564). Like Leonardo da Vinci Michelangelo was painter, sculptor, architect. He himself chose sculpture as his profession, and for a long time refused to consider himself a painter at all. But other people had more faith in his powers than he had himself, and Pope Julius II chose him to paint the ceiling of the Sistine Chapel in the Vatican. Michelangelo protested in vain—the pope would have his way. We may imagine the great man shut up in the Chapel with his problem—what theme was wonderful enough to use for such an undertaking? Finally he planned to represent the world from creation of man to the flood. At first he intended to have other painters work from his designs but they could not satisfy him, and at length he decided to do all the work himself. The ceiling paintings, of which the "Creation of Man" is regarded as the greatest, occupied him for about four years, and when we consider that in doing this work he was for the most part forced to lie on his back we can see what a tremendous task it was that the pope had set for him.

Later, the successor of Julius ordered Michelangelo to paint one more picture for the Sistine Chapel on the end wall by the altar. This picture, which took the artist almost eight years to complete, was the "Last Judgment," probably the most famous single painting in the world. It contains three hundred fourteen figures, which represent almost every conceivable physical attitude and expression and the various mental and moral states.

Correggio. (1494–1534). Correggio, if we may believe the reports, was in his way as remarkable as Leonardo or Michelangelo, and for this reason: They received the best of training in their art, and visited all the art centers; Correggio lived and died in a little town near Parma, and there is nothing to show that he ever visited any city but Parma or that he had any efficient teaching. Some authorities say that he probably never saw a great painting besides his own, but there is one interesting story which says that he once, after having long desired it, saw a picture of Raphael's. He studied it carefully, and then exclaimed, not boastingly but with intense conviction, "I too am a painter." There were some things which Correggio seemed to understand better than anyone who preceded or followed him, notably the treatment of light and shade, some people to-day criticise Correggio's pictures as being too sweet, and lacking in depth; but his "Night," with the darkness of the manger partly dispelled by the light which comes from the Christ-child, will always remain a favorite.

Raphael. (1483–1520). Raphael, unlike Leonardo and Michelangelo, was not a sculptor or an architect, but just a painter. But he was perhaps the most versatile painter that ever lived. He could paint a sacred scene for an altar piece of a church, a portrait, a study from classical mythology, or a historical scene all superbly, and yet each in so different a manner that even a critic could scarcely tell that they came from the same hand. Most famous of all his paintings is the "Sistine Madonna," the best known and best loved of all madonnas.

The same Pope who had engaged Michelangelo to decorate the Sistine Chapel decided to employ Raphael to redecorate a series of rooms in the Vatican. These had already been frescoed by great artists, but the pictures were destroyed and Raphael was given free hand. Over a window appears the "Deliverance of St. Peter," a painting which in its treatment of light and shade rivals Correggio. But the two greatest paintings which the rooms contain are the "Disputa," which shows the Christian saints fascinated by a glorious vision of God, Christ, the Holy Spirit, and the great characters of scripture; and the "School of Athens." This latter painting represents an assembly of the great philosophers, poets and men of science of Greece. The remarkable thing is that Raphael, who was not a philosopher, should have been able to give this brilliant Grecian civilization such exact representation.

His great painting of the "Transfiguration," by some critics regarded as the greatest painting in the world, was unfinished at the artist's death. The upper group, Christ, Moses and Elias above the mount, and the middle group, Peter, James and John upon the mount, were completed, but the lower group of the demoniac, his parents and the people was not finished. Raphael's body was laid out in his studio, by the side of his unfinished masterpiece, and all Rome flocked to the place to do honor to the "prince of painters."

Other Painters. Venice produced a school supreme in its use of color and Titian (1477–1576), chief of the Venetians, takes rank with the other great masters. Others of note who flourished in the sixteenth century were Palma Vecchio, who painted beautiful women with marvelous effect; Tintoretto, a master of color; and Paul Veronese, who was skilled in portraying banquet scenes.

Painting Elsewhere in Europe. In the Netherlands the fourteenth and fifteenth centuries produced the Van Eycks, a famous family of Flemish painters. Hans Memling (1430–1494) was another master of the Flemish school whose work shows a distinct advance in the progress of painting. In Germany the influence of the Flemish school made itself felt and produced in Albrecht Dürer of Nuremberg the most celebrated master of his time north of the Alps. Then followed Hans Holbein the younger, the greatest painter Germany ever had, who excelled in pictorial effects and in use of detail, as well as in general effect. Lucas van Leyden stands as the most important painter of the early Dutch school.

Seventeenth Century. With the seventeenth century came a decline, brought about chiefly by the slavish imitation of the great painters of the preceding period. In Italy the art of Guido Reni, Albani and Domenichino, representatives of the Bolognese school, begun somewhat earlier by the Caracci, was excellent for its technical qualities, but it was entirely lacking in originality.

In Flanders Rubens became the greatest exponent of Italian art. His pictures are especially good for their strength and brilliant coloring. His chief pupil was Van Dyck, noted for his portraits. At this same time there arose also a noted class of *genre* painters, among whom was Teniers the younger. In Holland art had attained a distinct individuality in Franz Hals, and to a greater degree in Rembrandt, both portrait painters distinguished for their remarkable groups. Holland, too, is the great exponent of landscape painting, as shown in the work of such men as Van de Velde, Ruysdael and Cuyp, and of *genre* painting, in the naturalism of Gerard Dow and Van Ostade.

Painting in Spain which stands alone in the prevailing religious ascetic character of its productions, reached its greatest epoch in this century, with the realism and religious fervor of Velasquez and Murillo.

Italian influence was very marked in France in the seventeenth century. Nicholas Poussin, figure and landscape painter, was one of the greatest painters France can claim. Claude Lorraine and Casper Poussin are painters of landscape, who, though born in France, yet worked in Italy and stand apart from the followers of the national style, which was coeval with the court of Louis XIV and representative of it, the chief exponents being Le Brun and Mignard.

Eighteenth Century. In England the first native painter of note was William Hogarth, who turned directly to nature in his art. He was followed by Sir Joshua Reynolds and by Gainsborough, distinctly original. A school of water-colorists arose at this time, among whom Turner stands preëminent.

Nineteenth Century. In France, David, a painter whose influence made itself felt

throughout Europe, was the great reformer. He insisted upon a return to the study of the antique, and his followers number a few distinguished men, notably Gross and Guerin. Géricault, a pupil of Guerin, was the first to break with the extreme classicism of the school of David. Ingres, Delacroix and Delaroche, the last named noted for the reality of his historical subjects and for the tenderness and pathos of his sacred pictures, are the most distinguished names of the more direct and romantic style. Modern French landscape art, founded upon an impulse received from England, has had Decamps, Rousseau, Corot, Millet and Jules Breton as its chief exponents. The work of Regnault illustrates remarkably the tendencies of modern French painting. Bastien Lepage with his literal renderings of nature, strongly influences the younger British school; and Meissonier, Gérome, Bougereau, Constans and Puvis de Chavannes, a decorative artist, are some of the chief members of a school which is at the present time influencing the art of the world.

Germany during the eighteenth century remained stationary in matters of art, but with the revival in France came a similar but slightly later movement in Germany. The chief of the revivalists was Overbeck, and following him came his pupil Cornelius, one of the greatest of modern German painters, whose work is best seen in Munich. Schnorr von Carolsfeld chose for his subjects the medieval history and myths of Germany and also produced an extensive series of illustrations of the Bible. Lessing is famous, both for his historic and landscape pictures. Gabriel Max and Menzel, in historic painting; Knaus Vautier, Metzler and Bochmann, in *genre*, and Achenbach, in landscape, are worthy of note.

Among the best known later artists in Great Britain are John Constable, Rossetti, Burne-Jones, William Morris, Leighton, Watts, Millais, Landseer and Alma-Tadema. In *Russia* painting remained at a standstill long after the Byzantine period, but since 1850 it has made great advances. It has produced Swedomsky, historical painter; Veresthchagin, a traveler artist, and Kramsköe, a religious painter.

Until about 1825 the United States had followed Great Britain in art, as in literature. Since that time, however, a marked development of individuality and excellence has been apparent. At the French exhibition, the most famous and exclusive of art exhibitions, there was in 1855 no American section; in 1868 a part of a small section was allotted to the United States; in 1878 it had a large exhibit, and in 1900 it furnished the largest exhibit except France and received more honors than any other nation except France. Most American painters complete their education abroad, usually in France; but there is an increasing number of good art schools in the United States, and with the excellent instruction offered in the public schools, they are rapidly cultivating an appreciation of the best in art. Of nineteenth-century American painters the following are among the best known: West, Copley, Stuart, Allston, Bierstadt, Church, Inness, La Farge, Sargent, Vedder, Whistler and Moran. A more comprehensive knowledge of painting may be obtained by reading the biographical articles on the different painters.

Twelve Great Paintings. The artist-critic W. W. Story has given the following as the twelve greatest paintings in the world:

The Transfiguration, Raphael, 1519, in the Vatican.
Sistine Madonna, Raphael, 1518, Dresden Gallery.
Last Judgment, Michelangelo, 1534–1541, Sistine Chapel.
Communion of Saint Jerome, Domenichino, 1614, Vatican.
Descent from the Cross, Rubens, 1612, Antwerp Cathedral.
Descent from the Cross, Volterra, about 1545 Church of S. S. Trinita de' Monti, Rome.
Last Supper, Da Vinci, 1498, Santa Maria delle Grazie, Milan.
Assumption of the Virgin, Titian, 1518, Venetian Academy.
The Night, Correggio, 1522, Dresden Gallery
Aurora, Guido Reni, 1609, Rospigliosi Palace, Rome.
Beatrice Cenci, Guido Reni, 1509, Barberini Palace.
Immaculate Conception, Murillo, 1678, Louvre.

Picture Study. Picture study serves as a delightful recreation in school, provided the study is so presented that it appeals to the children. To be successful the teacher should heed the following suggestions:

1. Choose simple pictures of subjects which the children can understand and which appeal to their own experiences.
2. Remember that pictures representing action are of greater interest to childen than those which represent respose.
3. The picture should be large enough to enable the objects represented to be easily seen.

THE MELON EATERS

THE GLEANERS (Above)

THE ANGELUS (Below)

4. The pictures should possess artistic merit as to both color and form. Cheap colored paintings and pictures poorly drawn should be avoided.

5. If possible, give the children the opportunity to live with the picture several days before beginning the study.

6. When the picture is first placed before the children give a brief description of it.

7. During the study call attention to and ask questions about only those features which the children can understand and enjoy.

8. Do not attempt a complete analysis.

9. Do not moralize. If the picture has a moral the children will find it.

10. Give a brief and interesting sketch of the artist, calling attention to at least one or two of his other works.

The "Melon Eaters." This is the picture of some street urchins who lived in the city of Seville, Spain, a long time ago. From their surroundings we should judge they had gone into the country for vegetables, and when returning had loitered by the way. Their clothing indicates that they are from poor families, but the expressions on their faces show them to be contended and happy.

Notice the attitude of the boy about to eat the piece of melon. How eagerly his gaze is fixed upon it! The expression of the other boy indicates that he is enjoying the sport as much as his companion. Possibly the first boy is about to attempt to swallow his piece of melon on a wager. At all events, the second boy is so interested in what his companion is doing that he has delayed eating his own share.

The dog is likewise interested in the sport. See how eagerly he is watching his master, and his wistful expression indicates that he also would like to share in the feast.

Notice the perfect proportions and the natural pose of the figures. The details of the vegetables in the foreground and the shrub at the right combine to preserve the balance of the picture. All these features prove that this picture is the work of a great artist. We cannot study it without seeing in our imagination the young man Murillo wandering about the streets and market places of his native city and making careful study of its child life—life which he portrayed with such vividness and strength.

This picture is of interest to children, especially to boys of the age of those of this reproduction. Its reality to life, the action expressed, and the composition all appeal to the child. Moreover, this is a work of the greatest Spanish painter. These conditions make it especially suitable for school use.

Questions. How many boys in the picture? Are they brothers? Why do you think so?

Which boy owns the dog? Why do you think so?

Where do you think these boys have been?

Where are they going?

What objects in the picture lead you to form this opinion?

Where are the boys seated?

What are they doing?

Are they having a good time? Why do you think so?

What is the dog doing?

What do you think he wants?

What do you like in the picture? Why?

Have you seen any other pictures by this artist? Can you name them?

The Artist. For biographical sketch, see the article on Murillo in these volumes. The following additional facts should be used to lend interest to the study. Others can be added if time and opportunity permit.

When a young lad Murillo was accustomed to decorate with his sketches whatever objects came in his way.

Murillo's parents were poor, but they clearly recognized the artistic talent which their son showed at an early age, and placed him under the care of his uncle, who was a printer and a draughtsman, and under whom he obtained his early training.

Murillo early learned to paint pictures of the children frequenting the street and market places of the city of Seville, showing their many grotesque sports and pranks. The picture used in this study is one of these sketches.

When Murillo was twenty-two his uncle removed to Cadiz. Murillo remained in Seville and supported himself for a time by painting inexpensive pictures for the public fairs. Though hastily executed, some of these pictures reveal the strength and skill of the artist to a remarkable degree.

Murillo merited and won the love of Seville, and his home became the resort of artists and lovers of art.

Murillo's most famous paintings are on religious subjects. One of these, the "Immaculate Conception," was sold in 1852 for over $120,000, the highest price that had been paid for a painting up to that time.

Murillo is described as a pious, patient, brave man. He worked incessantly, sold his paintings for a high price and acquired a large fortune.

The Gleaners and the Angelus. The two pictures shown here are among the world's famous paintings. The first one, "The Gleaners," shows a part of a harvest field on what is, apparently, a large farm. In the background are farm buildings, haystacks, a wagon, and figures of workers; in the foreground, three peasant women, in simple peasant costume, are bending down to pick something from the ground. What is there in that to make a picture beautiful and famous?

That is the very question which some people asked when the artist, Jean François Millet began to produce his pictures of peasant life. Classic pictures of the Greek gods, portraits of high-born gentlemen and ladies in gorgeous raiment, idealized shepherdesses with snowy flocks—these they could understand and appreciate but there was nothing lovely in peasant life. As Millet continued to produce his paintings, however, the critics began to realize that there was something about them

which they had not grasped at first, and that was a perfect sympathy with peasant life, which made the paintings not so much pictures as glimpses of real life.

Now how did it happen that a great artist had so perfect a sympathy with the lowest class of the French people? A little study of his life will show us that Millet was himself of peasant family, and spent his boyhood working in his father's fields. Although it is possible that no one noticed the difference, the boy must have been different from the other boys about him; he saw things which they never saw, things which he was afterward able to put on canvas and thereby enable other people to see them. And very early he found that there was something besides working in the fields in which to interest himself. In an old Bible which was almost the only book in the peasant's hut in which they lived there were some old engravings which stirred his ambition, and he began to spend all of his leisure hours—and they were none too many—in drawing. His father, unlike many peasant fathers, did not discourage his son in an attempt to be something which his father had not been, but took some of his drawings to a painter in Cherbourg and asked him to accept the boy as a pupil. The artist at once recognized the boy's talents, and promised to receive him in his studio; but in a very short time the older Millet died, and the oldest son, then twenty-one years of age, returned to the field and took up his father's work.

Circumstances afterward became a little better, so that the young man was able to go to Cherbourg, and later to Paris to study. At the very first he did not confine himself to the subjects which later won him fame, but painted "The Golden Age," "Oedipus Unbound," and other classical pictures. Recognition of his great genius was very slow, and he suffered the most extreme poverty; but we are glad to know that before he died he knew that his work was appreciated, and gained by his art enough so that he was no longer really poor.

Now we can see why Millet was able to paint with such sympathy and exactness his three gleaners. These women are not workers in the harvest-field; their "gleaning" does not mean helping to get in the bounteous harvest. From the earliest times there has existed in certain countries a sort of unwritten law which declares that after the harvesters have gathered in the grain the poor peasants may come into the fields and pick up for their own use what is left. The Book of Ruth, in the Bible, is chiefly built around this custom, and we find many references to it throughout history.

The lower picture, "The Angelus" may mean even more to us than "The Gleaners." This, too, deals with an old custom, which still prevails in some Catholic countries. At morning, noon and evening the church bells are rung to remind people to stop in their work and say a prayer. This prayer is a brief one beginning "The Angel of the Lord," and is called the Angelus, from the Latin word for angel. In the picture, the bell is just sounding from the church spire far in the distance, and the two peasants at work in the field have stopped their work and bowed their heads to pray. A soft, evening light fills the picture, and we can tell from the attitude of the peasants that it is no mere formal prayer which they are repeating. The atmosphere of reverence is over the entire picture. These two paintings of the great peasant artist of France well repay study.

Study of "Aurora." The following study of "Aurora," by Guido Reni, can be made to serve two purposes: It may help to instill a love of

AURORA

pictures in the minds of the children, and it may be of great assistance in teaching language or composition work.

First, if possible, let each child have a copy of the picture in his own hands that he may study it carefully. Second, let each child tell,

PAINTING

ANCIENT

Egypt

1. First historical notice in the nineteenth century B. C.
2. The most flourishing period, between 1400 and 525 B. C.
3. The art the offspring of religion.
4. Paintings found mainly on the walls of tombs and temples, mummy cases, rolls of papyrus.
5. Representative of public events, sacrifices and ordinary affairs.
6. Under supervision of priests. No knowledge of perspective.

Greece

1. Painting and sculpture subordinate to architecture
2. Its birth about 600 B. C., by Cimon of Cleonae.
3. Polygnotus, 480 B. C., the founder of historic painting. His principal works: The Taking of Troy, and Visits of Odysseus to Hades.
4. Apelles, the most celebrated of Grecian painters. Contemporary with Alexander.

Rome

1. No Roman painter worthy of note.
2. Specimens in fresco and mosaic in tombs and baths of Rome and at Pompeii.
3. Under the influence of Christianity for three centuries painting was practiced secretly in the catacombs.
4. After the establishment of Christianity in the state, churches were adorned with paintings.
5. Byzantine decorations. In mosaic.

MEDIEVAL AND RENAISSANCE

1. Giovanni Cimabue, called the father of modern painting. The first to give individual life, grace and movement to figures.
2. The Florentine School.
   a. The most decorative of all Italian painting.
   b. The work of the Van Eycks, Hans Memling.
   c. Verrocchio, the master of Leonardo da Vinci, and Ghirlandajo, the master of Michelangelo.
   d. Leonardo da Vinci, head of the Florentine School of the sixteenth century.
   e. Michelangelo, architect, sculptor, painter.
   f. Fra Bartolommeo and Andrea del Sarto, the best colorists of the school.
3. The Venetian School.
   a. Arose under the influence of Giovanni Bellini.
   b. The school became supreme in its use of color.
   c. Titian, chief of Venetians, ranks with the masters of the other schools.
4. Umbrian School. Characterized by intense religious sentiment.
5. The Roman School.
   a. A continuation of the Umbrian.
   b. Centers about the great Raphael, the prince of painters.
6. Correggio, head of the Lombard School, unrivaled for grace, harmony, light and shade.
7. The Renaissance in Germany.
   a. Dürer. One of the first to excel in etching and the most celebrated master north of the Alps.
   b. Hans Holbein, one of the greatest of German painters. Excelled in pictorial effects.
8. In the Netherlands.
   a. Lucas van Leyden. The most important painter of the early Dutch School.
   b. Rubens, the greatest exponent of Italian art in Flanders. Van Dyck, his chief pupil.
   c. Rembrandt, the most famous of the Dutch painters.
9. In Spain.
   a. Velasquez, chief of the early Spanish painters.
   b. Murillo, the most important Spanish painter of religious subjects.

TWELVE GREAT PAINTINGS

1. The Transfiguration—Raphael, 1519.
2. Sistine Madonna—Raphael, 1518.
3. Last Judgment—Michelangelo, 1534-1541.
4. Communion of Saint Jerome—Domenichino, 1614.
5. Descent from the Cross—Rubens, 1612.
6. Descent from the Cross—Volterra, 1545.
7. Last Supper—Da Vinci, 1498.
8. Assumption of the Virgin—Titian, 1518.
9. Immaculate Conception—Murillo, 1678.
10. Aurora—Guido Reni, 1609.
11. Beatrice Cenci—Guido Reni, 1609.
12. The Night—Correggio, 1522.

MODERN

England

1. Hogarth, the first native painter of note. Turned directly to nature.
2. Reynolds and Gainsborough, distinctly original.
3. Turner pre-eminent in a school of water-colorists.
4. Best known later artists: Constable, Rossetti, Morris, Leighton, Watts, Landseer, Alma-Tadema.

France

1. David, the great reformer. The return to the study of the antique. Gros and Guerin his pupils.
2. Gericault. Broke with the school of David.
3. Ingres, Delacroix, Delaroche. The most distinguished names of romantic style.
4. Exponents of modern French landscape art: Decamps, Rousseau, Corot, Millet.
5. Painters influencing art of the present time: Regnault, Lepage, Meissonier, Bougereau, Constans, Gérome,

Germany

1. Remained stationary during eighteenth century.
2. Overbeck. Chief of the revivalists.
3. Cornelius. One of the greatest of modern German painters.
4. Schnorr von Carolsfeld.
5. Lessing. Also, Menzel, Vautier, Metzler.

Russia

1. Has made great advance since 1850.
2. Swedomsky, historical painter.
3. Verestchagin, a traveler artist.

United States

1. Followed Great Britain in art and literature until 1825.
2. In 1900 it furnished the largest exhibit except France
4. The best known painters: West, Stuart, Allston, La Farge, Sargent, Vedder, Whistler, Moran.

Questions on Painting

What is oil painting? Water color? Fresco? Encaustic? How produced?

How and on what were the early paintings of the Egyptians, Greeks and Romans executed?

How many centuries before Christ was painting practiced in Egypt? Was the art closely related to religion? In what relation was it held to sculpture and architecture?

Was any attempt made by the Egyptian artists to imitate nature?

Of what great historic value are these early Egyptian paintings? Give three reasons for your answer.

By whom were the principal works of Roman art produced?

Describe the conditions of Roman painting for the first three centuries after Christ.

What were the Catacombs? How were they built? Decorated? Protected? Inhabited?

By what art in the Catacombs did the early Christians indicate their religious devotion?

In what did Filippo Lippi excel? What poet has written about him?

Who was Botticelli? Andrea del Sarto?

When did art in the United States take on an individuality of its own?

What are the strikingly distinguishing marks between American art of 1855 and 1900?

Name five well-known American painters, with a great painting from each. For what was Whistler noted?

What are the twelve greatest paintings in the world; by whom, where found, and when produced?

What discovery of the Van Eycks produced a revolution in the art of painting?

By what process are mosaics made?

What are the only examples of pure Grecian painting?

Characterize painting in Spain in the seventeenth century.

Name three great painters of France, of England and of Germany.

Who was the most important painter of the early Dutch school?

as fully as possible, what he sees. Then the following series of questions will help to bring out the points of the picture. Some of the questions the children can answer themselves from their observation, but a number of them the teacher will have to answer for them.

1. What is the name of the picture? "Aurora."

2. Why is it so named? "Aurora" means "Dawn," and this is a picture of the dawn of the morning.

3. What is Aurora in the picture? The draped figure that is leading.

4. Who was Aurora? The Greeks believed that she was the goddess of the morning, who went ahead of Apollo, the sun god, scattering flowers in his way and opening for him the doors of the morning.

5. Who is riding in the golden chariot? Apollo, god of the sun.

6. How many horses are hitched to the chariot? Four. (If the children cannot discover four horses let them count the noses.)

7. Has Apollo any other attendants besides Aurora, in this picture? Yes there is Lucifer, the torch-bearer, called son of the morning, and the graceful figures of the Hours.

8. Which way is Aurora looking? At Apollo, to see whether he is ready to have her open wide the gates of morning.

9. Are they traveling on the earth? No, on the clouds. You can see the earth below.

10. Are they traveling slowly or rapidly? Why do you think so? (Call attention to the horses' manes, and other signs of action.)

11. Which is the most beautiful face in the picture?

Is there anyone in the picture who has nothing to do?

12. By whom was this picture painted? Guido Reni. He was born at Bologna in 1575 and died in 1642. His father, who was himself a musician, hoped that his son would be a musician also, and the boy studied music for some time. He finally made up his mind, however, that he would never be happy unless he became a painter, so his father allowed him to have an artist's training. He painted many other pictures, some of them very beautiful, but this is the best known of all his paintings.

13. Where is the original painting? On the ceiling of a palace at Rome. (Explain that when these beautiful paintings are on the ceiling, looking glasses are placed below them so that people can see them more easily.)

14. Have you any question that you would like to ask about the picture?

Now let each child give a description of the picture, or let the whole class compose the description orally and then allow each child to write it out. Studies similar to this may be made of any picture.

Related Articles. Consult the following titles for additional information:

NOTABLE PAINTERS

Abbey, Edwin A.	Bartolommeo, Fra
Allston, Washington	Bastien-Lepage, Jules
Alma-Tadema, Lawrence	Bellini, Giovanni
Angelico, Fra	Bierstadt, Albert
Apelles	Blashfield, Edwin H.
	Bonheur, Rosa

Botticelli, Sandro
Boughton, George H.
Brangwyn, Frank
Breton, Jules A.
Burne-Jones, Edward
Caravaggio, Michelangelo
Carracci
Copley, John S.
Corot, Jean B. C.
Correggio
Crane, Walter
Domenichino
Doré, Paul Gustave
Dürer, Albrecht
Eyck, Hubert Van and Jan Van
Gainsborough, Thomas
Gelée, Claude
Gerome, Jean Leon
Giorgione
Giotto
Guido Reni
Hals, Frans
Herrera, Francisco
Hobbema, Meindert
Hogarth, William
Holbein Han (Elder and Younger)
Hunt, William Morris
Inness, George
Israels, Josef
Kaulbach, Wilhelm von
La Farge, John
Landseer, Edwin H., Sir
Leighton, Frederick, Lord
Leutze, Emanuel
Lippi, Filippo
Meissonier, Jean L. E.
Memling, Hans
Michelangelo
Millais, John Everett, Sir
Millet, Jean François
Munkacsy, Mihaly
Murillo, Bartolomé Estéban
Parrish, Maxfield
Peale, Charles Wilson
Peale, Rembrandt
Perugino, Pietro Vannucci
Raphael Santi
Rembrandt
Remington, Frederic
Reynolds, Joshua, Sir
Rossetti, Gabriel Charles Dante
Rubens, Peter Paul
Ruysdaal, Jacob Van
Sargent, John Singer
Sarto, Andrea del
Steen, Jan
Stuart, Gilbert
Teniers, David
Tintoretto
Tissot, James Joseph Jacques
Titian
Turner, Joseph M. W.
Van Dyck, Anthony
Velazquez, Don Diego
Veresthchagin, Vasili
Veronese, Paul
Vinci, Leonardo da
Watteau, Jean Antoine
Watts, George Frederick
West, Benjamin
Whistler, James A. McN.
Wilkie, David, Sir
Zeuxis
Zorn, Anders

GENERAL ARTICLES

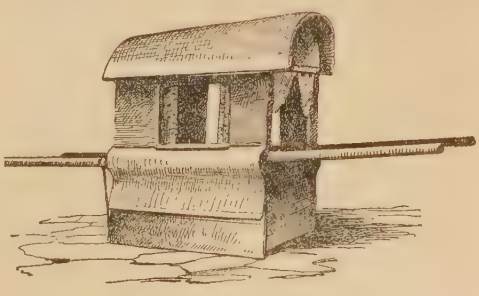
Angelus
Barbizon Painters
Cartoon
China Painting
Corcoran Art Gallery
Cubist School of Painting
Foreshortening
Fresco
Holy Family
Impressionist School of Painting
Madonna
Metropolitan Museum of Art
Nimbus
Ochre
Paint
Perspective
Sepia
Ultramarine
Water Colors

PAK'ENHAM, EDWARD MICHAEL, Sir (1778–1815), an English soldier, born in Ireland. He entered the army and became major general in 1812, served in the Peninsular War under the Duke of Wellington, winning distinction for his gallantry and success as a leader, and commanded the British expedition against New Orleans in 1814. He was killed in battle at New Orleans January 8, 1815. See NEW ORLEANS, BATTLE OF.

PALANQUIN, *pal an keen'*, a covered conveyance, used in India, China and other countries of the East. It is a sort of box, about eight feet long, four feet wide and four feet high, having windows fitted with wooden shutters and a seat for one person. It is borne by poles on the shoulders of two men. The palanquin is not now extensively used, because in India and other countries where it was formerly employed by Europeans, the building of railways and the improvement of roads have made other means of conveyance more practicable and desirable.

PAL'ATE, the name applied to the roof of the mouth. It consists of two portions, the *hard* palate in front, the *soft* palate behind. The former is bounded above by the palatal bones, is lined by mucous membrane and is continuous behind with the soft palate. It supports the tongue in eating, speaking and swallowing. The soft palate is a movable fold, suspended from the border of the hard palate in the back of the mouth. It consists of mucous membranes, nerves and muscles and forms a sort of partition between the mouth and the openings from the nostrils. Its lower border is free and from the middle of it hangs the *uvula;* on each side are two curved folds of mucous membrane, called the *arches,* or *pillars,* of the soft palate. Between these on each side of the pharynx are the two glandular bodies known as *tonsils.* The soft palate comes into action in swallowing and is of great importance in the utterance of certain sounds. The special use of the uvula is not well known. It is often relaxed or enlarged, causing a troublesome cough. Glands, secreting the mucus which lubricates the throat during the passage of food, are abundant in the soft palate. See TONSILS.

PALAT'INATE (German *Pfalz*), the name of two German states, distinguished as the Upper Palatinate and the Lower, or Rhenish, Palatinate. The former was bounded mainly by Bohemia and Bavaria, and its capital was Amberg. The Lower Palatinate, or Palatinate proper, lay on both sides of the Rhine and included the towns of Heidelberg and Mannheim. The counts Palatine were in possession of the Palatinate and the districts



PALANQUIN

belonging to it as early as the eleventh century, and they were long among the most powerful princes of the German Empire. By

the Peace of Westphalia in 1648 the Lower Palatinate was separated from the Upper, Bavaria receiving the latter, while the former became a separate electorate of the Empire and was henceforth generally known as The Palatinate. By the treaties of Paris, 1814 and 1815, the Palatinate was split up; Bavaria received the largest part, the remainder being divided among Hesse-Darmstadt, Baden and Prussia.

PALEONTOL'OGY, the science which treats of life that existed upon the earth before the age of man. Paleontology includes the study of fossils of both plants and animals. It is closely related to anatomy, botany and geology, and is one of the sciences upon which comparative anatomy is founded. The study of fossils according to the principles of paleontology is comparative, and it has enabled geologists to determine the relative advantages of the different rock formations and to divide geologic time into the periods and systems as they are now generally accepted. See GEOLOGY; FOSSIL.

PALEOZO'IC ERA, that division of geologic time extending from the Protozoic to the Mesozoic Era and including the Cambrian, Ordovician, Silurian, Devonian and Carboniferous periods, each of which is described in these volumes. The time covered by the Paleozoic Era was exceedingly long, as shown by the great thickness of the combined rock formations and the development of life from the protozoa to the vertebrates. See GEOLOGY; MESOZOIC ERA, and articles on the periods and systems named above.

PALER'MO, a seaport, the capital of Sicily, on the north side of the island, on the Bay of Palermo. The city is ornamented with numerous fountains and has many notable buildings, among which are a cathedral of the twelfth century, the churches of San Salvatore, San Domenico and San Giovanni degli Eremiti, a royal palace, a picture gallery, an armory, an archiepiscopal palace and a customhouse. The city is the seat of a university which has about 1,600 students, and is the center of all government activity on the island.

Palermo was probably founded by the Phoenicians, and it afterwards became the capital of the Carthaginian possessions in Sicily. It was taken by the Romans in 254 B. C. The Saracens held it for a time, and in 1072 it fell to the Normans. The German emperors and the French subsequently held it, and from the time of the Sicilian Vespers it shared the fortunes of the Sicilian kingdom. Garibaldi captured the town in 1860. Population, 1915, 345,891.

Square in Bethlehem

PALESTINE, *pal'es tine,* or **THE HOLY LAND,** a small country on the eastern shore of the Mediterranean Sea, in the southwestern part of Syria, famous as the scene of Christ's ministry. Revered alike by Christians and by Jews, Palestine during the four centuries following 1516 was a possession of the Mohammedan Turks. In the fall of 1917, in the last twelve months of the World War, the country that had cradled Judaism and Christianity was reclaimed from the Crescent by British forces, after a long and bitter campaign. A world rejoiced when, on December 10, the holy city of Jerusalem received the victorious soldiers of a Christian nation. This triumph and the collapse of the Germanic alliance foreshadowed the severance of Palestine from the Turkish Empire and the erection of a Jewish state under British or French protection. The establishment of such a state would mean the realization of the dream of those Jews who have been active in the Zionist Movement (which see).

Palestine was early known as Canaan and Philistia. In the time of the patriarchs it was occupied by a number of independent tribes, but in the eleventh century B. C. it was united by Saul into a kingdom, which passed successively to David and Solomon. In the tenth century the kingdom was cut in two—Israel, in the north; Judah, in the south. The former fell before Assyria in 722 B. C., and the latter was conquered by Babylonia in 586 B. C. In the time of Christ, Palestine was held by Rome and was divided into four provinces, known as Galilee, Samaria, Judea and Peraea. In the seventh century A. D. it fell into the hands of the Mohammedans, whose brutal treatment of the Christians was one of the causes of the Crusades. In 1516 Palestine became a part of the Turkish Empire.

Modern Palestine. The life of the people has not greatly changed throughout the centuries. The shepherds still watch their

flocks upon the slopes, the farmer still tills his soil with the primitive implements of ancient times. The country is divided from north to south by a continuous water system, the Jordan River and three lakes—the waters of Merom, the Sea of Galilee and the Dead Sea. West of the river a chain of hills extends north and south; east of it, in the north, are the mountains of Lebanon, the highest of which, Mount Hermon, snow-capped in winter, is 9,000 feet high. The southwestern part is the most fertile, and there, on the slopes of the Judean hills, are raised olives, figs, apricots, grapes and grain. Across the river to the east the country is for the most part barren.

The climate is not unhealthful, but monotonous. There are two seasons, summer and winter, the former dry and hot, the latter rainy. The vegetation includes both temperate and sub-tropical plants—oaks, oleanders, sycamores, ashes and cedars among the forest trees, and almonds, azaleas, narcissus, acacias, crocuses and anemones among the flowering herbs and shrubs. Population, about 700,000.

Related Articles. Consult the following titles for additional information:

Beersheba	Hebron	Lebanon, Mountains of
Bethany	Jaffa	Nazareth
Bethlehem	Jericho	Nebo, Mount
Canaanites	Jerusalem	Olives, Mount of
Crusades	Jesus Christ	Samaria
Dead Sea	Jews	Syria
Galilee	Jordan	World War
Gethsemane	Judea	

PALESTINE, Texas, the county seat of Anderson County, 100 miles southeast of Dallas, on the International & Great Northern Railroad. The city is in an agricultural and fruit-growing country, near salt mines and deposits of iron ore. It contains railroad offices and shops, cotton factories and an ice plant, and has a considerable trade in cotton, grain, fruit and vegetables. There is a Y. M. C. A., a Carnegie Library, a convent, a city hall and three hospitals. The place was settled in 1846 and was incorporated in 1870. The commission form of government was adopted in 1910. Population, 1910, 10,482; in 1917, 12,075 (Federal estimate).

PALESTRINA, *pal es tre'nah*, Giovanni Pierluigi da (1524–1594), one of the greatest of musical composers, was born at Palestrina, near Rome. Pope Julius III, formerly a fellow townsman, made him music director of Saint Peter's. On the death of Julius he became organist successively of the churches of Saint John Lateran and Santa Maria Maggiore. When in 1564 there arose a need for reform in Church music, Palestrina composed a mass which brought him appointment to the highest position possible for a composer in the Church of Rome. A great celebration in his honor was held in Rome in 1575. The works of Palestrina, especially the masses, have been a model for subsequent sacred music. His style was the culmination of the simple and unemotional music of his day and the noblest manifestation of the austere and majestic forms suited to express deep religious sentiment.

PALISADES, *pal i saydz'*, a beautiful series of nearly perpendicular rocky cliffs which extend along the western bank of the Hudson River from Haverstraw, N. Y., to Weehawken, N. J., a distance of nearly thirty miles. The Palisades rise abruptly from the water's edge to heights ranging from 200 to 500 feet and add much to the scenic loveliness of this part of the Hudson. A large tract of land in the vicinity, comprising 18,000 acres, has been reserved for a public park. Plans have been made for an interstate public playground here which will necessitate an expenditure of $6,000,000. The park is managed by a board of commissioners who permit camping, picnics and any other proper use of the grounds that will contribute to the enjoyment of people.

PALLA'DIUM, a metallic element found by Wollaston in 1803. It is a ductile metal of a bright silvery luster, having a general resemblance to platinum, but harder, lighter and more easily oxidized. It occurs in platinum ores, in the nickel and copper ores of Ontario and in the gold-bearing sands of Brazil. As an alloy it is used in the manufacture of scientific instruments and in making the movements and springs of clocks. Because of its hardness it is used as a coating for silvered ware and to some extent in dentistry.

PALLADIUM, originally, any statue of a protecting deity of a city. The term is specifically applied to a statue of Minerva, said to have fallen from heaven, and which was preserved at Troy. The belief of the Trojans was that as long as the palladium remained in their city they could not be conquered. Diomedes and Ulysses succeeded in carrying it off, and many legends are told as to its fate. The Romans professed to believe that the Trojan Palladium had been

brought by Aeneas to Italy, but several Greek cities also claimed it.

PALLAS ATHENE. See MINERVA.

PALM, *pahm*, a large family of plants, interesting because of their variety and beauty, but chiefly because of their great value to man. There are about 1,200 species, most of them native to the tropics. Of these some are vines, slender as reeds and several hundred feet long; others are low, bushy plants with leaf stems springing directly from the ground; still others are trees with trunks from three to five feet in diameter and reaching a height of a hundred feet. This last is by far the largest group.

The palms are divided into two great classes—those having pinnate or fern-shaped leaves, such as the *cocoanut palm* and *date palm;* and those with fan-shaped foliage, such as the *palmetto palm* of the southeastern states, the *Washington palm* of the North American desert and the *Palmyra palm* of Southern Asia. The peculiarity of most palms is the tall, branchless trunk, with its cluster of foliage, and in some species also fruit at the tip. As the trunk pushes upward in its growth and produces new foliage the old dies, and throughout its length its surface bears the scars and, in the case of some varieties, the dry, dead stumps of fallen leaves. The *doum palm* of Arabia is the only important species bearing branches.

FAN PALM

With the exception of grass, there is no plant in the whole vegetable kingdom so important economically as the palm. It has been put to a thousand or more uses. It has been made to supply the three fundamental necessities of man—food, shelter and clothing. The fruit of many palms constitutes important food in many regions. Important among these are the date and cocoanut palms; the *bacaba palm* of Brazil, which produce clusters of berries yielding a valuable drink and an oil, and the *sago palm*, the trunk of which yields a starchy meal called *sago*. The trunks of some species of palms are converted into excellent timber, suitable for houses, ships and other structures. The long stems of certain varieties are used for wicker furniture. The leaves of most of them are extensively used in the tropics as thatch for dwellings. The fibers of many palms are fine and strong and can be woven into cloth.

Among the other innumerable products of this group of plants are oil, from the *oil* palm, used for lubricating and illumination; vegetable ivory from the seed of the *ivory* palm, and wax, which exudes from the trunk of the *wax* palm. The spines which grow upon the trunks of certain species are used as needles and fishhooks. Mats, baskets, rope, twine, ship sails, rugs, screens, bedding, candles, wine, honey, resin and hammocks are a few of the articles made from palms. In desert regions where other vegetation is scarce the palm is regarded almost with veneration by the traveler, who finds refreshment in its shade and fruit.

Related Articles. Consult the following titles for additional information:

Betel	Palmetto
Cocoanut	Palm Oil
Date	Palmyra Palm
Doum Palm	Sago
Ivory Palm	

PALMA, TOMAS ESTRADA (about 1836–1908), a Cuban general and patriot, first president of Cuba. He was born of wealthy Cuban parents and was educated in Spain. He fought with the Cuban revolutionists in the war of 1868–1878 and rose to the rank of general. He was elected president of the Cuban provisional government, but was captured by Spain and imprisoned. On his release he went to Honduras, and became postmaster-general of that republic. Later he removed to the United States and opened a school at Central Valley, N. Y. At the outbreak of the Cuban revolt of 1895 he closed his school and became one of its active supporters. On gaining their independence in 1901 the Cubans elected Palma as President, and four years later he was re-elected. President Palma was a man of good intentions but allowed himself to be dominated by politicians, whose unscrupulous practices ultimately led to his resignation.

PALM BEACH, FLA., one of the winter playgrounds of the United States, a village on the southeast coast of Florida, with a permanent population of 1,000 and a winter influx of about 5,000. It is on the Florida & East Coast Railroad, 300 miles south of

Jacksonville. Some of the largest resort hotels in the country are here.

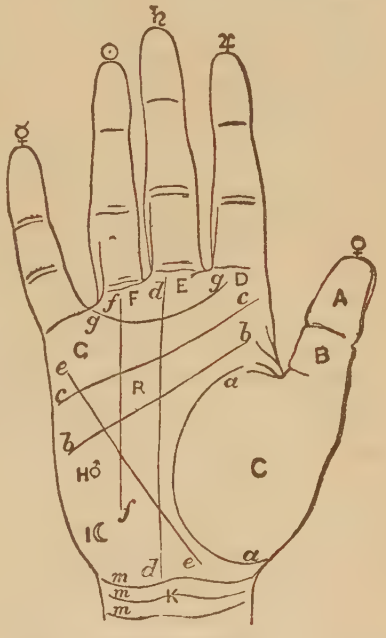
West Palm Beach, the county seat of Palm Beach County, is on the west shore of Lake Worth, opposite the more famous village. The latter town is also attaining prestige as a winter resort. The permanent population is over 5,000, by local estimate.

PALMERSTON, *pahm'ur stun,* HENRY JOHN TEMPLE, third Viscount (1784–1865), a British Prime Minister. He was educated at Harrow and in the universities of Edinburgh and Cambridge, and succeeded to his father's title in 1802. When only twenty-three he entered Parliament. Two years later he became Secretary of War and held the office until 1828. Except for a brief interval he was Secretary of State for Foreign Affairs from 1830 to 1841. In the latter year he went out of office with the Whigs, but with their return to power five years later he resumed the duties of the Foreign Office. Because of his open though unofficial approval of Louis Napoleon's act in declaring himself emperor of France, Palmerston was dismissed from the Cabinet in 1851, but returned with the new Ministry the following year, taking office as Home Secretary. In 1854, when the Earl of Aberdeen's administration proved unable to cope with the Crimean situation, Palmerston was called to the position of Prime Minister by the unanimous voice of the nation, and his vigorous foreign policy brought the war to a termination. After the defeat of the conspiracy bill in 1858 Palmerston resigned, but returned to the premiership the following year and remained in the office the rest of his life.

Palmerston's personal charm brought him unbounded popularity throughout England, but his reputation was even greater abroad than at home. He made his influence felt in every part of the world, and his forceful foreign policy maintained for Great Britain through some of the most serious international complications in its history the respect of every other nation.

PALMETTO, *pal met'o,* a North American palm found in the coast states from North Carolina to Florida. The plants of one species grow to be about forty feet high, and each is topped by a cluster of large fanlike leaves having an expanse of from one to five feet. The wood is very porous but exceedingly durable, and is much used in the construction of wharves. A dwarf species, called *cabbage palm,* is stemless, the cluster of fanlike leaves growing out from the ground. This palm is represented on the coat of arms of South Carolina, which is sometimes called the *Palmetto State.* Another dwarf species is the *saw palmetto,* which produces berries having a certain medicinal property. Palmetto leaves are much used in making hats, fans, baskets and in certain districts to thatch native huts.

PALMISTRY, *pahm'is tri,* or **CHIROMANCY,** *ki'ro man si,* is the so-called art of "reading the palm"—the art which professes to discover the temperament and character of any one, as well as the past and future events of his life, from an examination of



PALMISTRY

A, will; B, logic; C, mount of Venus; D, mount of Jupiter; E, mount of Saturn; F, mount or Apollo; G, mount of Mercury; H, mount of Mars; I, mount of the Moon; K, the rascette; a, a, line of life; b, b, line of head; c, c, line of heart; d, d, line of Saturn, or fate; e, e, line of liver, or health; f, f, line of Apollo, or fortune; g, g, the girdle of Venus; R, the quadrangle; m, m, m, the bracelets of life.

the *palm* of his hand and of the lines traced upon it. As an art, palmistry appears to be of great antiquity. It has an ancient literature of its own in India and was to some extent, at least, known to the ancient Greeks. To-day it has many believers, even though its theories have been frequently disproved. This article states the facts relating to palmistry as practiced.

Of the cultivation of palmistry among the Romans there is little evidence; but in the second century Artemidorus of Ephesus, the author of a work on the interpretation of dreams, is said to have devoted a whole treatise to the subject, which, however, is not extant.

The writers of the Middle Ages made frequent reference to the subject, and an important work was printed at Augsburg in 1475 by Johann Hartlieb. In the sixteenth century there were several treatises on the subject; in the end of the eighteenth century a celebrated palmist foretold the downfall of Napoleon; in recent times two Frenchmen, D'Arpentigny and Desbarrolles, have become the leading authorities, and it is on their works that modern English books on the subject are chiefly founded. The observation of the fingers and joints of the hand is quite as important to the chiromant as that of the palm itself. The thumb is generally regarded as the most important part of the hand. The first, or upper, phalanx of the thumb, when well developed, shows the presence of will and decision of character; the second, according to its development, indicates more or less logical power (see accompanying diagram for explanations through the remainder of the article). In studying palmistry the *mounts* of the hand, with the marks on them, and the lines in the palm are considered. The mounts are the elevations at the base of the fingers and thumb and in the side of the palm which extends from the root of the little finger to the wrist. The mounts are seven in number and are named from the planets, by the signs of which they are also known, namely, ♀ for Venus, ♃ for Jupiter, ♄ for Saturn, ☉ Apollo, ☿ Mercury, ♂ Mars, ☾ the Moon. When well developed, the mounts indicate the possession of the quality associated with the respective planets—for instance, Jupiter denotes pride and ambition; Saturn, fatality; Apollo, art or riches; Mercury, science or wit; Mars, courage or cruelty; Venus, love and melody; the Moon, folly or imagination. But the effect of a greatly developed mount may be modified by the lines in the palm or by other signs.

There are four principal lines—namely, the line of life, which surrounds the thumb, and which, if long, indicates a long life; the line of head, the line of heart, and the rascette, or the bracelets. The bracelets if well marked strengthen the effect of the line of life, each bracelet indicating thirty years of life. The line of heart, if long, clear cut and well colored denotes an affectionate and devoted character; and the nearer the line stretches to Jupiter the better the character. If the line end in a fork, so much the better. In actors and mimics this line ascends the mount of Mercury. A good line of head—that is, a clear-cut, long, unbroken line—indicates the presence of superior intellectual qualities. If the line stretch to the mount of the Moon, it indicates imagination. A winding headline shows folly and indecision of character; a linked line (like a chain) denotes want of concentration. The other lines (which are not present in all hands) are the line of Saturn, or fate; the line of Apollo; the line of liver, or health, and the line of Venus. A long, clear-cut line of Saturn foretells a happy and prosperous life, while breaks or windings in the line foretell misfortunes or obstacles; a good line of Apollo shows that its owner will be successful in art; a good liver-line promises a long and healthy life; the Venus line, when present, indicates a character very liable to be influenced by the passion of love. Such marks on the mounts or lines as stars and crosses have their respective significations. A good open space between the lines of head and heart (the quadrangle) indicates a generous and noble disposition, while a very narrow space in the quadrangle is a sign of avarice and egotism.

PALM, *pahm*, OIL, an oil obtained from the fruit of the oil palm, a native of the west coast of Africa. This tree grows to the height of thirty feet, bears a tuft of large pinnate leaves and has a thick stem, covered with the stumps of the dead leaves. The fruits, which are borne in dense clusters, are about one and one-half inches long by one inch in diameter, and the oil is obtained from their pulp. The oil is of an orange-yellow color, and when chilled hardens and looks like butter, for which it is sometimes substituted. Like butter, it soon becomes rancid. It is extensively employed in the manufacture of soap and candles and for lubricating machinery.

PALM SUNDAY, the last Sunday of Lent, the Sunday which immediately precedes Easter, so called from the custom of using palm branches in the religious exercises on that day commemorating Christ's triumphal entry into Jerusalem. Palm Sunday was first celebrated in the fourth cen-

tury, at Jerusalem, with a dramatic procession in which a Christian bishop, acting the part of Christ, rode into the city on an ass, accompanied by crowds waving palm branches. Later, in the Western Church the day was celebrated with a solemn mass, and the custom arose of blessing the palms to be carried in procession. The consecrated palms were taken home by the people and treasured.

PALMYRA, one of the ancient cities of Syria, situated in an oasis in the Syrian desert, 120 miles northeast of Damascus. According to tradition, it was founded or enlarged by Solomon and is believed to be the Tadmor mentioned in the Bible. In the third century, A. D., when Zenobia was queen of Palmyra, the city was destroyed by the Romans. It was rebuilt, then was again destroyed by the Saracens. It was partly restored, but gradually declined, and in the fifteenth century was plundered by Tartars. The modern town has a population of about 1,500 Arabs, who live wretchedly in a few squalid huts. Only the ruins of an ancient temple of Baal and a few other fragments stand to show that a populous and thriving city once flourished there.

PALMYRA PALM, a palm topped by a magnificent cluster of fan-shaped leaves, common in India, the Malay Archipelago and tropical West Africa. The trunk grows to be from twenty to seventy feet high and the leaves attain a length of about four feet, and have about seventy-five rays. This is one of the most valuable palms, its various parts being used in nearly 800 different ways. In parts of India the natives depend almost entirely on this tree to supply all their wants. When the plant is young it is eaten as a vegetable; the fruit of the older trees also is edible. The trunks are used for building, the leaf stalks for making fences. From the leaves are made hats, baskets, mats, fans and thatched roofs. The fibers go into twine and rope.

PALO ALTO, *pah'lo ahl'to*, BATTLE OF, the first important battle of the Mexican War, fought May 8, 1846, at the village of Palo Alto, eight miles northeast of Brownsville, Texas. The American force of about 2,300 was commanded by General Taylor, while the Mexican force of 6,000 was commanded by General Arista. The Americans were victorious after an all-day contest, chiefly with the artillery. Arista retreated to Resaca de la Palma, where he was again defeated a few days later. See MEXICAN WAR.

PALO ALTO, CALIF., settled in 1891, is in Santa Clara County, thirty miles southeast of San Francisco, on the Southern Pacific Railroad and an interurban line. The town is famed as the location of Leland Stanford Junior University (which see). Most of the town's activity centers around this great school. There are two banks and a building and loan association, a Carnegie Library and a hospital. Population, 1917, about 5,500.

PALPITA'TION OF THE HEART, a distressing ailment in which the characteristic symptom is a rapid beating of the heart. Shortness of breath and a choking sensation are other symptoms. Palpitation may indicate a number of disorders, including heart disease, goiter and indigestion; it is sometimes brought on by shock, epileptic seizures and other nervous attacks. If it is chronic or unusually severe in its manifestations a physician should be consulted. An ice pack placed on the heart is sometimes an effective measure of relief.

PAMIR, *pah meer'*, the highest plateau in the world, occupying the region of Central Asia where four mountain systems unite—the Himalayas, Hindu Kush, Tian Shan and Kuen-lun. The tableland has an area of about 36,000 square miles and a general elevation of more than 13,000 feet, and from it rise lofty, snow-capped summits. The plateau is for the most part barren, but in the valley of the River Oxus, which rises here, and in the oases made by lakes, there is good pasturage for cattle. The country is unendurably cold in winter and hot in summer. Notwithstanding its hostile climate, two trade routes have crossed it for ages. The Persians call this region "the roof of the world," and they believe the white race originated there.

PAM'LICO SOUND, a shallow lagoon on the southeastern coast of North Carolina. It is about eighty miles long and from eight to twenty-five miles wide, and is separated from the ocean by long, narrow, sandy islands. Pamlico is connected with Albermarle Sound by the Croatan Sound. It is separated from the Atlantic by a series of long, narrow beaches and is connected with it by three navigable inlets. At the extreme eastern point of this beach is Cape Hatteras.

The sound receives the waters of the Neuse and Pamlico rivers and contains valuable oyster beds.

PAM'PAS, the name usually applied to the great plains of South America, but especially to the grass-covered plains of Argentina. During the rainy season, these plains are covered with vegetation, and they provide pasturage for large herds of cattle and sheep. The name is a Spanish word meaning *plain*.

PAN, the chief woodland divinity in Greek classical mythology. As the god of flocks and herds, he was originally represented as an old man with two horns, pointed ears, a goat's beard, a goat's tail and hoofs. He was believed to be the son of Mercury and to have been named by the gods. The worship of Pan was well established, particularly in Arcadia. Pan invented the syrinx, or pandean pipes.

PANAMA, *pah na mah'*, the capital and chief city of the republic of Panama, on the south coast of the isthmus, on Panama Bay. As the harbor is shallow, trade is carried on chiefly through the terminal port of Balboa, constructed by the United States. Panama was founded in 1519, but its importance dates from the completion of the Panama Railroad in 1855, of which the city is the Pacific terminus. Up to 1904 the inhabitants were almost entirely supported by the inter-oceanic commerce over the railroad, but since the latter date canal operations by the United States government have contributed many additional advantages (see PANAMA CANAL).

Formerly the climate was considered very unhealthful for all except natives, and because of the lack of proper sanitary conditions the inhabitants suffered greatly from fevers and malaria. In 1904 the United States government took possession of the Panama Canal Zone, of which the city is geographically a part. By treaty between the United States and the republic of Panama, the former installed systems of waterworks and drainage and was given full authority in matters of sanitation in the city, but with no other jurisdiction within its limits. The Sanitary Corps of the United States army has made Panama a healthful place of residence.

Panama has a large cathedral, several convents, Jesuit college, the national university, the national theater, a government palace and a municipal building. All government buildings are modern. Two miles inland are the largest hotel on the isthmus and also the general hospitals for canal operatives. There is a fairly extensive commerce, the imports being four times the value of the exports; the former include cotton goods, coal, flour, silk and rice; the latter, bananas, rubber, ivory nuts, gold and hides. Population, 1917, 60,761.

PANAMA, ISTHMUS OF, the strip of land which connects North and South America. Its general direction is east and west. It is also called the Isthmus of Darien. At its narrowest point it is only thirty-one miles wide. See PANAMA, REPUBLIC OF; PANAMA CANAL.

PANAMA, REPUBLIC OF, a small country occupying nearly all of the narrow isthmus joining North and South America. At the beginning of the year 1903 it was a province of Colombia, a republic in the extreme northwestern part of South America. In November of that year it declared its independence because of the refusal of the Colombian Senate to ratify a treaty with the United States providing for the excavation of a waterway across the isthmus. This action on the part of Panama made possible the construction of the great Panama Canal, the most remarkable engineering feat of modern times. The country of Panama extends nearly east and west between Colombia and the Central American state of Costa Rica. The Caribbean Sea, an arm of the Atlantic, bounds it on the north, and the Pacific Ocean washes its southern coast. It is about 425 miles long and from 31 to 118 miles wide. The area, 32,380 square miles, is nearly equal to that of the state of Maine.

Physical Features. The surface over most of the country consists of hills and low mountains whose slopes are densely covered with trees. There is no regular arrangement of ranges, except in the west near the boundary line. Here the mountains are grouped into systems. The western part, too, is diversified by several lofty volcanoes long since burnt out. The largest drainage basin, between the Colombian boundary and the Gulf of Panama, is that of the Tuyra River, which empties into the Pacific. The central part is drained by the Bayano; west of this stream

is the Chagres, flowing into the Caribbean Sea. The waters of the Chagres contribute part of the supply used by the locks of the canal.

Panama has a tropical climate and the two seasons characteristic of countries in the torrid zone—the rainy and the dry. Jungle swamps, where disease-carrying mosquitoes breed in countless numbers, occur, but sections under the influence of the United States have been rendered healthful through sanitary reforms (see PANAMA CANAL, subhead *Sanitation*).

Production and Industry. Only about three-eighths of the country is occupied, and of this area but a small proportion is properly cultivated. The United Fruit Company has about 35,000 acres devoted to banana raising, this being the most important cultivated product. Other products include raw rubber, coffee, cacao, cocoanuts, sugar, tobacco and various dyestuffs and medicinal products. Cattle are reared for export, and in the Gulf of Panama there are valuable pearl fisheries. Panama possesses nearly every common mineral except coal, but the mines are still undeveloped. The general high prices throughout the world during and after the great war led more people than formerly in Panama to turn to agriculture.

In the republic there are about 200 miles of railroads, including the Panama Railroad, which is nearly fifty miles in length and is owned by the United States. A concession to build a new road along the Atlantic coast line was granted in 1917, but work was not commenced until after the World War.

People and Cities. In 1916 the population was estimated at 450,000. The most numerous element is the mestizo, or mixed race, a people of Spanish, Indian and negro blood. There are, besides, native whites, people of Spanish descent; Indians, descendants of the original inhabitants of the country; blacks, the descendants of African slaves; Chinese and West Indians, and European and American immigrants. Panama, on the Pacific coast, is the capital city and metropolis; the city next in size is Colon, on the Atlantic coast. These ports are the terminals of the canal, but except for purposes of sanitary regulations, neither is included in the Canal Zone, over which the United States has jurisdiction. There are a number of small ports on both oceans.

Government. The constitution, adopted in 1904, and amended in 1917, provides for a national assembly of one chamber. Its members, called Deputies, are elected by popular vote for four-year terms, there being one member for every 10,000 inhabitants. Meetings are held biennially. The President of the republic must be thirty-five years of age; is chosen by popular vote for four years and is not eligible to reëlection. He appoints his Cabinet members, and also names five supreme court judges. Governors of the eight provinces were formerly appointed by the President. According to an amendment of 1917 they are to be elected beginning with 1920. There are three Vice-Presidents.

Education and Religion. The government maintains public schools throughout the eight provinces. These are attended by about 22,000 children. A number of young people are also educated at government expense in Europe and the United States. There are about a dozen private institutions, and a national university was opened in 1911 in Panama City. Roman Catholicism is the prevailing religion, but in the Canal Zone Protestantism is the stronger.

History. The Caribbean coast of Panama was explored in 1502 by Columbus, and in 1513 Balboa saw the Pacific Ocean from a "peak in Darien." Darien was the old name for Panama. In the early colonial period the isthmus was a commercial highway of no mean importance, and was prized by Spain for that reason. When, in 1821, Spanish rule came to an end, Panama united with Colombia, but ten years later, on the breaking up of the latter, it joined the republic of New Granada. In 1885 Panama again became a part of Colombia, but the union was never satisfactory. From 1846 to 1903 there were over fifty revolutionary outbreaks on the isthmus, and in the latter year the dissatisfied province broke away from the home government. The United States recognized the new republic, and a treaty was immediately negotiated for the construction of the long-awaited waterway. Panama declared war against Germany in April, 1917, in accordance with a policy of friendship for the United States.

Related Articles. Consult the following titles for additional information:

Balboa
Colombia
Colon
Panama (City)
Panama Canal

PANAMA CANAL, an artificial waterway across the Isthmus of Panama from Colon, on the Caribbean Sea, to Panama, on the Pacific Ocean. Its completion in 1914 marked the fulfilment of a project that had stirred the ambitions and imagination of mankind for about four centuries, and it represents one more link in the great chain of communication that is year by year welding the nations closer together and making the world one great neighborhood.

Early History of the Isthmian Project. The first desire for an isthmian canal was aroused by the Spanish conquest of Peru and Chile. At that time Ferdinand, king of Spain, proposed to cut a canal through the Isthmus of Panama, and his successor, Philip, thought favorably of a route across Nicaragua, but on account of European complications nothing was done for years.

The United States government first became interested in the isthmian canal project in 1825, when its representative to Nicaragua secured concessions for the construction of such a canal, and the following year Henry Clay, who was Secretary of State, ordered an examination of the route, but the matter was dropped soon after. Three years later, the king of Holland obtained a franchise for the construction of the canal, but this plan was annulled the following year, and nothing further of importance was done until 1847, when Great Britain obtained control of the proposed route. Great Britain's claim was disputed by the governments of Nicaragua and the United States, and no steps were taken to push the work. In 1849 Cornelius Vanderbilt formed a company which secured concessions from Nicaragua for the construction of a canal. In the meantime the discovery of gold in California increased the demand for such a waterway, and the Vanderbilt company began operations.

After spending about two millions of dollars, however, they found that the project was beyond their ability and attempted to secure the aid of the United States government. This aid was refused and the project fell through.

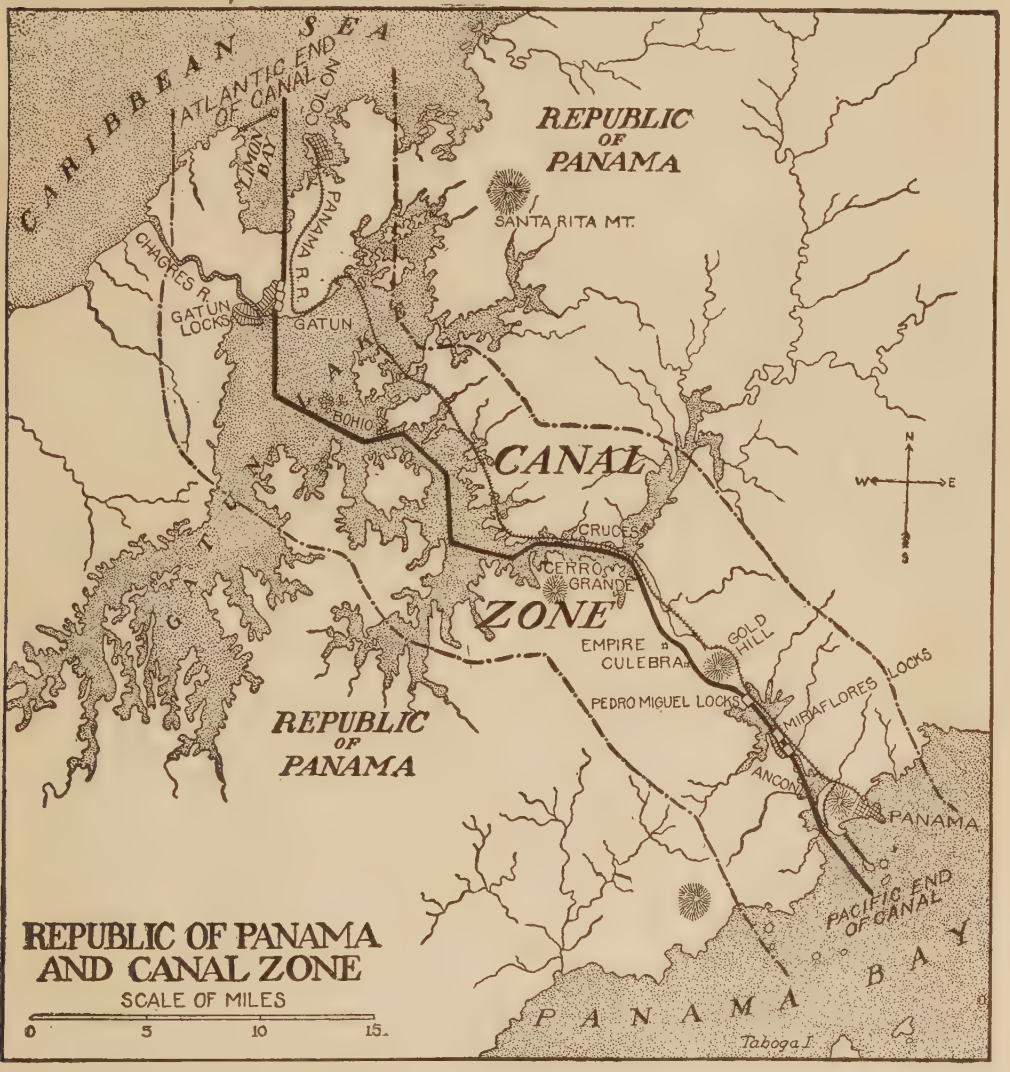
Beginnings of the Canal. The history of the Panama Canal proper dates from 1878, though some years previous to this, George M. Totten, chief engineer of the Panama Railroad, made a tentative survey for a canal, following the line of the railroad, and showed the feasibility of its construction, estimating the cost at from $60,000,000 to $150,000,000. His report was followed by a government survey, under the direction of Commander E. P. Lull of the United States navy. This survey resulted in locating the canal practically on the present route. In 1878 a concession was given Lieutenant Weyse and others by the government of Colombia to construct and maintain a canal across the isthmus. In the year following, a congress of 135 engineers was called at Paris, under the direction of Ferdinand De Lesseps, the builder of the Suez Canal. After a thorough discussion of the various routes proposed, the congress voted unanimously in favor of the Panama route.

Immediately after the adjournment of the congress the Interoceanic Ship Canal Company was organized, and De Lesseps was made president. This company proposed to cut a sea level canal 29½ feet deep, from 72 to 78 feet wide at the bottom and from 92 to 164 feet wide at the surface. At the close of 1888 this company had expended $200,000,000 and had not completed one-third of the work. Being pressed for funds, the company resorted to bribery as a means of securing additional aid, and their operations grew into the most noted financial scandal in French history. The company was finally declared bankrupt, and a receiver was appointed.

The receiver was authorized to organize a new company, but on account of legal difficulties, he was unable to complete the reorganization until 1894. The new company, known as the Panama Canal Company, was capitalized at $13,000,000, and stock to the amount of $1,000,000 was given to the United States of Colombia. The company abandoned the sea level project and substituted a series of locks in place of it, since this would greatly reduce the expense of construction. During the next few years a little work was done and about $8,000,000 had been expended when the company again ceased operations.

In the meantime, several events had occurred to keep alive the interest in the Nicaragua route, and in 1895 the Congress of the

United States authorized the appointment of a commission to investigate thoroughly its advantages. This commission, generally known as the Ludlow Commission, made a tentative survey of the Nicaragua route and reported to Congress. In 1899 President McKinley was authorized to appoint a larger commission, with powers to make a more thorough and complete investigation. This is generally known as the Walker Commission, from its Chairman, Rear-Admiral John G. Walker of the United States Navy. After a very thorough investigation, the commission reported in favor of the construction of a canal by the Nicaragua route, stating that the principal reason for this report was the financial difficulty involved in purchasing the right of way from the Panama Canal Company, which wanted $102,400,000 for their franchises and property, while the estimate of the commission on the value of these assets was $40,000,000.



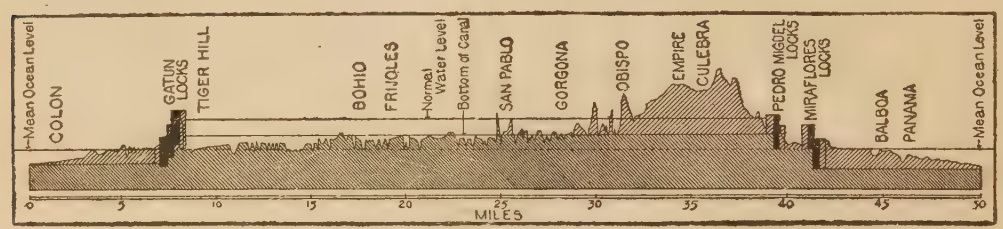
Immediately after this report was rendered to Congress, the French company offered to sell to the United States their entire claims, including franchises, machinery, right of way and the Panama railway, for $40,000,000, the value placed upon them by the commission. Following this offer the commission made a supplemental report recommending the pur-

chase of the property and the adoption of the Panama route. Meanwhile the House of Representatives had passed a bill authorizing the construction of the canal by the Nicaragua route, but this bill was rejected by the Senate in view of the supplementary report of the commission, and in place of it the Senate passed the Spooner Act. This authorized the President to purchase of the Panama Canal Company all its assets pertaining to the canal, for the sum of $40,000,000, providing a valid title to the property could be secured and a satisfactory treaty for the construction and control of the canal could be ratified with the United States of Colombia. This measure was accepted by the House and became a law in June, 1902.

In pursuance of the provisions of this act, a treaty was negotiated between John Hay, Secretary of State of the United States, and Dr. Herran, minister plenipotentiary from Colombia, and presented to the Senate of the Fifty-seventh Congress, in January, 1903. The treaty provided for the construction and control of the canal by the United States and the payment to the United States of Colombia of $10,000,000 in gold for the concessions granted, and an annuity of $250,000 a year after nine years following the ratification of the treaty. At an extra session of the Senate this treaty was ratified on March 18, 1903, and sent to the Colombian government. After several months of delay, during which the treaty was the subject of several stormy debates in the Colombian Senate, it was rejected by that body before its final adjournment in August. This rejection led to the immediate withdrawal of the senators from the state of Panama, and ultimately to the secession of that state and the formation of a new republic, which was soon recognized by the United States government.

Immediately after its organization the Republic of Panama sent to the United States Senate a treaty providing for the construction of the canal on nearly the same terms as were imposed in the proposal rejected by the United States of Colombia. The Panama treaty was ratified by the United States Senate February 24, 1904. It contained a provision that for purposes of administration of canal affairs a strip of land from ocean to ocean, through the center of which the canal was projected, should be ceded to the United States for the sum of $10,000,000. In addition, for the canal concession, there was to be an annual rental of $250,000 paid to the Republic of Panama. This strip, designated by the American government as the Canal Zone, covers 475 square miles.

Early in March, 1904, President Roosevelt appointed a canal commission. On May 4th the commission took formal possession of the canal property and the payment of the $40,000,000 was promptly made to the French company.



PANAMA CANAL IN PROFILE
Upper shading showing the excavated portion.

The Canal a Reality. The first chief engineer, John F. Wallace, and his successor, John F. Stevens, both distinguished engineers, were able to do little construction work on the canal because it was not until June, 1906, that Congress finally adopted the report of the engineers in favor of a lock canal. Bids were invited from contractors, but when these were opened in January, 1907, none seemed satisfactory. President Roosevelt therefore placed the work under the control of the corps of engineers of the United States army, and Major George W. Goethals became chief engineer and chairman of the Isthmian Canal Commission on April 1, 1907. During 1907 and 1908 excavation was rapidly pushed, and work on the Gatun and Miraflores dams was begun. In 1909 the power house and concrete plant at Gatun were put into operation and the first concrete was laid. In the next four years the work progressed so rapidly that the canal was finished and ready for operation more than a year before the date set for its completion. On Septem-

PANAMA CANAL

Former Culebra Cut, at Empire, looking north from hill on west bank. This has been renamed Gaillard Cut, in memory of the engineer who sacrificed his life to duty.

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PANAMA CANAL

First ocean-going vessel passing through Gatun Locks, June 8, 1914. Type of electric locomotive to be used in towing.

ber 26, 1913, a tugboat was successfully passed through the Gatun locks, and on October 10 the Gamboa dike was blown up, allowing the waters of Gatun Lake to flood the Culebra cut. The first self-propelled vessel to pass through the canal from ocean to ocean was the crane-boat *Alex La Valley*, on January 7, 1914. The total cost of construction was over $370,000,000.

On August 15, 1914, the canal was opened to commerce by the passage through it of the government steamship *Ancon*, a vessel of 9,000 tons. On board were the Secretary of War and 200 guests. For various intervals in 1915 and 1916 traffic was interrupted because of landslides at Gaillard Cut, formerly called Culebra Cut, but these difficulties were gradually overcome, and since early in 1917 ships have been passing through without delay. On January 3, 1917, Lieutenant-Colonel Chester Harding was appointed governor of the Canal Zone, succeeding Major-General Goethals.

Sanitation. The completion of the Panama Canal would have been impossible without the splendid work of William C. Gorgas and his aides of the sanitary department. The extermination of the mosquito, the installation of drainage and sewage systems, the war on yellow fever and other tropical diseases—these made it possible for white men to live and work efficiently. Panama City and Colon, for purposes of sanitation only, are also under the jurisdiction of the United States.

Canal Tolls. By act of Congress in 1912, American-owned ships were exempted from payment of tolls. This exemption was immediately attacked as a ship subsidy, and was also opposed by Great Britain as a violation of the Hay-Pauncefote Treaty of 1901. On March 5, 1914, President Wilson requested the repeal of the exemption clause, for the reasons given above, and also for its effect on the foreign policy of the United States. The clause was promptly repealed by the House on March 30, and after much debate by the Senate on June 11, with the amendment that the repeal did not mean a waiver of any rights. The amended bill was accepted by the House, and was signed by the President on June 15.

Facts and Figures. The summit elevation of the canal is about 85 feet above sea level. From the Atlantic end of the canal, in Limon Bay, to Gatun, is a sea level channel 6.9 miles long and averaging 500 feet wide. At Gatun the great locks, in three lifts, raise the level to 85 feet. These locks have two chambers side by side, each 110 feet wide, and will accommodate ships 1,000 feet long. From Gatun to Pedro Miguel, a distance of 31.5 miles, the channel of the canal passes through Gatun Lake and Culebra Cut. The lake, which has an area of 165 square miles, is formed by the overflow of the Chagres and other rivers. This overflow is held by two earth dams at Gatun and at Pedro Miguel. The Gatun dam is 800 feet long, including the concrete spillway, and has a width of 100 feet at its crest and 400 feet at the normal level of the water. At Pedro Miguel is another lock, through which vessels are lowered to the level of Miraflores Lake, 55 feet above the level of the Pacific. The two Miraflores locks lower vessels to tide level. The length of the canal from shore to shore is about 41½ miles, but the channel extends seaward for 4½ miles on the Atlantic side and 4 miles on the Pacific, making the total length of the canal and its approaches approximately 50 miles.

Nine and one-half to twelve hours is the time required for the passage of a ship from one end of the canal to the other. No vessel may enter or pass through the locks under its own power, but is towed by electric locomotives running on cog rails laid along the top of the lock walls. The number of locomotives required varies with the size of the ship; ordinarily four are used, two ahead, one on each wall, to pull, and two astern, to steady the motion of the ship.

PANAMA HAT, a fine, hand-plaited hat made from the young leaves of a palmlike plant native to Central America and Colombia. The leaves are gathered before maturity, and the soft parts are removed. The fibers are soaked in water to render them pliable, and the weaving is done by hand under water. The best hats are made of a single leaf and are therefore uniform in quality and tint. The fiber-producing plant, a stemless screw pine, has been introduced into the Philippines, and the natives there have become expert manufacturers of these hats. The great centers of manufacture of hats are the Central American states and the countries on the coasts of Northern and Western South America.

PANAMA-PACIFIC-INTERNATIONAL EXPOSITION, an exposition held at San

Francisco, in 1915, to celebrate the opening of the Panama Canal. The grounds occupied the north water front of San Francisco Bay and embraced 635 acres. The cost of the enterprise was $50,000,000, supplied by the city and the state.

Construction began in October, 1911, and more attention was paid to landscape effect than in preceding world's fairs. The grounds were divided into three sections. In the center was the Court of the Universe, 700 by 900 feet, with a sunken garden in the center. This court was designed to symbolize the meeting place of the Eastern and the Western hemispheres and the statuary, arches and other decorative devices carried out this idea. About this court were grouped eight of the large exhibit palaces. East of these was the Court of Abundance, adorned with Spanish-Moorish architecture; while to the west was the Court of the Four Seasons, designed on a classic Roman model. The Court of Flowers and Court of Palms were other beautiful landscape features.

The buildings were covered with ornamental travertine, and the predominating tone was old ivory, with reds, greens, blue so combined in their decoration as to produce an effect of oriental splendor. Flowers, vines, shrubbery and other ornamental plants and hundreds of pieces of statuary enhanced the loveliness of the scene. The most conspicuous architectural feature of the exposition was the Tower of Jewels, 433 feet high, a dazzling object constructed of many thousands of hand-cut glass prisms of all colors, suspended on a framework in such a way that the slightest breeze set them in motion, producing a gorgeous effect. Brilliantly illuminated at night, the tower appeared even more wonderful.

Other prominent buildings were the palaces of Fine Arts, Agriculture, Transportation, Mines and Metallurgy, Manufacturing and Industry, Horticulture, Liberal Arts, Education and Machinery, the last the largest building on the grounds. In addition to the landscape and large architectural features there were, at the western end of the grounds, the pavilions of foreign nations, buildings erected by the several states of the Union, a live-stock building, a large race track, an aviation field and drill grounds.

PAN-AMERICAN CONGRESS, a congress of delegates from the Republic of Mexico and the Central and South American states, assembled at Washington, October 2, 1889, for the purpose of discussing the formation of an American Customs Union, under which the trade of American nations with one another might be maintained. The congress voted to recommend the establishment of regular communications between the ports of the several American states, common trade and customs regulations, weights and measures, patent, copyright and trade-mark laws, a common legal tender silver coin and a plan for arbitration of all disputes.

The Congress of 1901-1902. The second Pan-American Congress, embracing all the American republics, convened in the city of Mexico, October 22, 1901. The main purposes of this congress were the same as those of the former. Plans for the construction of a railway to connect North and South America, for the establishment of a standard coin which shall be legal tender in all the countries represented, for a uniform system of quarantine and, in general, for bringing the American republics closer together, were recommended. A plan for arbitration based on that of the Peace Conference at The Hague, was adopted.

The Congress of 1906. The third congress was held at Rio de Janeiro, Brazil, in July and August, 1906, and was attended by representatives of all important nations of North America, South America and Central America. The principal topics under discussion were commercial relations, the codification of laws, the regulation of patents, the improvement of methods of sanitation, the construction of the Pan-American railway, the consideration of means of arbitration of disputes between nations and, most important of all, the discussion of the Drago or Calvo Doctrine. This, in effect, declares that debts owing by South American citizens or South American nations to nations of Europe cannot be collected by forcible intervention.

The Congress of 1910. The fourth was held in Buenos Aires, beginning in July. A resolution was offered recommending that all American states bind themselves to submit to arbitration all claims for damage that may be presented by their respective citizens and which cannot be settled through ordinary diplomacy. The name of the International Bureau of American Republics was changed to Pan-American Union (which see).

In 1915 a Congress was held in Washington, chiefly for the purpose of devising

PANAMA-PACIFIC INTERNATIONAL EXPOSITION

The Palace of Education. On the left is seen the dome of the Palace of Philosophy.

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PANAMA-PACIFIC INTERNATIONAL EXPOSITION

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A view looking towards San Francisco harbor. The Palace of Varied Industries is on the left, the Palace of Machinery on the right.

means to overcome difficulties arising from the World War.

PAN-AMERICAN EXPOSITION, an exposition held at Buffalo, N. Y., from May to November, 1901, to show the progress made by the American republics during the nineteenth century. The expense of the exposition, amounting to $10,000,000, was assumed by the citizens of Buffalo. The exposition was formally opened May 20 and was closed November 2. Eighteen countries, including Cuba and Haiti, made exhibits. Venezuela, Paraguay and Uruguay were not represented; the United States government spent $500,000 in special exhibits, and most of the states were represented by buildings and exhibits.

Architecturally the Pan-American Exposition will have an abiding place in American history. The buildings were of styles common in the South American countries, the harmonious blending of the colors producing a veritable "Rainbow City." The electric tower, the focus of the architectural scheme, stood 409 feet high, and from its base gushed a torrent of water, brought directly from Niagara River. President McKinley was shot while holding a public reception here on September 6, in the Temple of Music.

PAN-AMERICAN UNION, an official organization formed in 1890 as the International Bureau of American Republics and supported conjointly by the twenty-one republics in North America, Central America and South America. The Secretary of State is, by virtue of his office, chairman of the governing board of the Union, and the other members consist of the ambassadors and ministers of the other American republics to the United States. The executive officer is a director-general, who is elected by the governing board. The headquarters are in Washington, where the Union occupies a beautiful building, the gift of Andrew Carnegie. *The Bulletin of the Pan-American Union,* a beautiful monthly publication, $2 per year by mail, contains much valuable information. Two of the main purposes of the Union are the arbitration of disputes between the countries involved and the adoption of a common basis for coinage. See PAN-AMERICAN CONGRESS.

John Barrett (1866–), former minister of the United States to Siam, Argentina, Colombia and Panama, has been director-general of the Union since its organization. From 1907 until the organization of the Union he held a similar position in the Bureau of American Republics (the former name of the Union).

PANCREAS, *pang'kre as,* THE, a long flat gland, in structure like the salivary glands, that lies just behind the stomach. It is about eight inches long, an inch and a half wide and one inch thick. The pancreas communicates with the intestine by a duct which runs the length of the gland, and pours its contents into the duodenum. The pancreatic juice acts on starch, on fat and on proteids, changing the last into peptones, which resemble those formed by the gastric juice. It separates the fats into minute particles and into their chemical parts, namely, glycerine and an acid peculiar to each fat. The alkaline quality of the juice then makes soap of the fatty acids (see DIGESTION). Disease of the pancreas is sometimes a cause of diabetes (which see).

The sweetbread sold in meat shops is the pancreas of a calf or other animal.

PANCREATIN, *pan'cre at in,* used as an aid to digestion, is a yellowish-white powder extracted from the pancreas of a hog, killed about six hours after a full meal. The elements of pancreatin are *trypsin,* which digests proteids; *amylopsin,* which has the power of converting starch into sugar; *steapsin,* which emulsifies fats, and the enzyme that curdles milk. See DIGESTION.

PANDO'RA, in Greek mythology, the first woman on earth. Jupiter, angered at Prometheus for stealing fire from heaven for mankind, determined to punish man as well as Prometheus. To accomplish the former purpose he created a woman. All the gods bestowed gifts on her, and by reason of this she was called Pandora, which means *all gifts.* Mercury was instructed to take Pandora to Prometheus, who refused, however, to receive her. She was then taken to Epimetheus, the brother of Prometheus, who gladly took her into his house. A short time afterward, Mercury appeared with a box, which he left in the care of Pandora, giving her strict instructions not to open it. Her curiosity was too strong, however, and she removed the cover from the box. Away flew all man's blessings, but one, Hope, which Pandora saved by shutting the lid down again. According to some accounts, the box contained evils, which, when Pandora released them, scattered abroad and forever thereafter tormented mankind.

PANKHURST, EMMELINE (1858–), a militant English suffrage leader, whose long fight for political representation for women assures her a permanent place in the history of social development. Her father, Richard Goulden, and also her mother were warm advocates of woman suffrage. The daughter was born in Manchester, and was educated in England and in France. In 1879 she married Dr. R. M. Pankhurst, who was strongly in sympathy with her attitude toward suffrage, and together the two founded the Women's Franchise League. In 1903 Mrs. Pankhurst, then a widow, helped to establish the Woman's Social and Political Union, the organization which has been her chief support in suffrage activities.

About two years later, realizing that the quiet methods she had been employing failed to gain for the suffrage movement the desired recognition, she started a spectacular program which made her a world figure. This program embraced the "heckling" of government speakers, parading and damaging public property. Mrs. Pankhurst, as leader of the cause, was held responsible for the disturbances and damages, and in 1913 she was imprisoned. Refusing to eat, she impaired her health, and was released, only to be again taken into custody. Finally she went to Paris, where her daughter, outside the reach of British law, was editing the Suffragette. From there she sailed to America and lectured for a season on suffrage. In 1914 the English suffragists abandoned their militant practices for the duration of the World War.

Mrs. Pankhurst lived to see women granted parliamentary suffrage before the close of the war, and in 1918 she was a candidate for a seat in Parliament. She was, however, defeated.

PANSY. See VIOLET.

PANTASOTE. See LEATHER.

PAN'THEISM, in philosophy, the doctrine which considers God and the material universe to be identical. Pantheism has been the foundation of nearly all the chief forms of religion which have existed in the world. It was represented in the East by the Sankhya of Kapila, a celebrated system of Indian philosophy. The Persian, Greek and Egyptian religious systems were also pantheistic. Spinoza is the most representative pantheist of modern times. A twofold division of pantheism has been proposed—(1) that which loses the world in God, one being in whose modifications are the individual phenomena; (2) that which loses God in the world and totally denies the substantiality of God.

PAN'THEON, a celebrated temple at Rome, the best preserved of the ancient buildings; built in A. D. 123 by the emperor Hadrian. It is a large edifice of brick, built in circular form, 142 feet in diameter. It has the finest dome in the world, measuring 142½ feet in internal diameter and 143 feet in internal height, and its portico, almost equally celebrated, is supported by sixteen Corinthian columns of Egyptian marble. It is now a church and is known as Santa Maria Rotonda. Raphael and other famous men are buried within its walls. The Church of Sainte Géneviève, at Paris, one of the noblest of modern structures, was called Pantheon by blasphemous rebels in revolutionary times and the name has persisted. The illustrious men of France are buried there.

PAN'THER, one of the cat family, now supposed to be identical with, or a mere variety of, the *leopard,* native to Asia and Africa, and the *puma* of North America, also known as the *cougar* and the *American lion.* In earlier days the animal was most generally known as *painter,* a dialect corruption of its name. See LEOPARD; PUMA.

PAN'TOMIME, the expression of thoughts and emotions through gestures and actions and without words. This art was developed by the ancient Romans. In the earlist pantomimes, only one actor was upon the stage at a time, but later several actors appeared together. At first they wore masks. The art of pantomime flourished throughout the days of the Empire, and it later spread to France, where in the seventeenth and eighteenth centuries it had great vogue. The first pantomime in England dates from early in the eighteenth century. It was there that the well-known Christmas pantomime was originated, with the characters of Harlequin, Columbine, Pantaloon and others. At other times than Christmas, pantomimes were given, however, the basis of the acts being found usually in old fairy tales. Only occasional attempts have been made to produce pantomimes in the United States, the most noteworthy one being *Humpty Dumpty,* which gained wide popularity about 1870.

PA'PACY. See POPE.

PA'PAL STATES, or **STATES OF THE CHURCH,** the name given to that part of central Italy which, until the latter half of

the nineteenth century, was subject to the temporal authority of the Pope. The territory extended irregularly from the Adriatic to the Mediterranean and latterly comprised an area of about 15,000 square miles. Rome was the capital. The Papal States were, with the exception of the capital and the land immediately adjoining, made a part of the territory of Victor Immanuel in 1860, and Rome was annexed to the kingdom of Italy ten years later. At this date the temporal authority of the Pope ceased, except over his palace, the Vatican.

PAPAW, a native tree of the United States, growing principally in Michigan, New York, New Jersey and Kansas. It attains a height of about twenty-five feet, and produces a fruit five or six inches long, an inch thick and covered with a wrinkled brown skin. This fruit is pulpy, and contains numerous large kidney-shaped seeds; it is of no value for the table, but is enjoyed by birds. The bark of the papaw is sometimes made into fish nets.

PAPAW

PAPER. The wasp was the first paper maker. Centuries before alphabets were invented, or the art of writing was known, this little insect was busy plying his trade of building paper houses. Let any boy or girl who is surprised at this statement examine an abandoned wasp's nest, and notice the quality of the paper of which it is made. The wasp makes its paper of wood, and it is thought that the wasp nest gave men the idea of using wood in the manufacture of paper on a large scale.

The name *paper* comes from *papyrus*, a plant used by the Egyptians for a fabric to write upon. But papyrus is not paper, and the art of paper making did not originate with the Egyptians. It is not known who was the inventor, but it was made by the Chinese two centuries before the beginning of the Christian Era, and they were probably the originators. Paper was in use in Europe during the eleventh century, and by the thirteenth century it was well known. By the beginning of the fourteenth century it had become common in England, but it was not manufactured there until 1685. The first paper mill in the United States was built near Philadelphia in 1690, but it was more than one hundred years before paper was manufactured in large quantities.

Manufacture. Paper can be made from any vegetable fiber, also from silk and wool, though these substances are not desirable. Formerly all paper was made from cotton and linen rags, and the work was performed entirely by hand labor. The rags were cleaned and ground into a fine pulp which was floated in water. The consistency of the pulp determined the thickness of the paper. The tank was continually stirred to insure an even distribution of the pulp, and the paper was made by dipping into the tank shallow boxes called *deckles*, with bottoms of a wire screen of fine mesh. As the box was raised the water drained out, leaving a thin layer of pulp evenly distributed over the screen. The box was then inverted over a layer of felt, on which the forming paper fell. The layers of felt were placed in piles and pressed to squeeze out more water. They were then spread out and left until the paper became dry enough to hold together, when the drying was completed by hanging the sheets on lines in the yard about the mill, or in the drying room. Paper made in this way had a rough surface and was of poor quality.

Paper is now made wholly by machinery, and most of it is from wood pulp, but the fundamental processes of the old hand mill are still employed. The pulp is passed through three sets of grinders, called *engines*, to make it fine enough for a good grade of paper. These grinders consist of knives, fastened to revolving cylinders and playing between smaller knives in the bottom of an oval tank. The rotation of the cylinder gives the water in the tank a motion which draws the pulp under the grinder. During the process the necessary bleaching matter, sizing and coloring matter are added. When the grinding is completed, the pulp resembles a quantity of rice and milk. From the last grinder it is sent to the storage tank, from which it is pumped to the paper-making machine.

All machine-made paper is now manufactured on what is called the *Fourdrenier* paper-making machine. It is from 125 to 150 feet long, and its width depends upon the size of the paper it is designed to make. The machine is divided into three sections—that which receives the pulp and forms it into the sheet or web; that which dries the paper, and the finishing rolls, which are usually known as the *calender* rolls. The drying section contains a number of hollow steel cylinders, from one to three feet in diameter; they are heated by steam, which enters through the trunnions on which they turn. The calender consists of a number of solid steel rolls, which press and polish the paper as it passes between them.

The paper-making section of the machine is the most intricate and also the most interesting. It consists of a long, narrow trough, into which the pulp is pumped; an endless belt of wire cloth, about thirty feet long, mounted upon numerous small rollers and having beneath it a number of vacuum boxes which are connected with air pumps; an endess belt of felt, which extends from the belt of wire cloth over the first sets of drying rolls, and the *dandy* roll, which is a small roll covered with wire cloth and placed above the paper at the point where the belt of wire cloth meets that of felt.

The pulp is pumped from the storage tank into the trough, from which it flows in a wide, thin stream upon the belt of wire cloth. This has a vibrating motion from side to side, which weaves the fiber together and strengthens the texture of the paper as the pulp passes over it. Most of the water falls through the meshes of this cloth as the pulp passes along, and the vacuum boxes assist in drawing out much of the remainder. The even edges of the paper are secured by rubber bands, called *deckle bands*, on each side of the belt. The dandy roll presses down upon the upper surface of the paper and determines the style or quality. When the roll is covered with wire cloth of the same structure as that of the belt, a *wove* paper is made. When the roller contains wire bands which make straight parallel lines in the sheet, a *laid* paper is made. The *water mark*, which is seen by holding a sheet of paper to the light, is produced by placing the design upon the dandy roll and is impressed upon the web at each revolution of the roller. This is a guarantee of the quality of paper.

When the paper leaves the wire belt, it is practically completed, and all of the other operations consist in drying and finishing it. The belt of felt takes the web from the wire belt and carries it to the first set of drying rolls, from which it passes on to succeeding rolls, until all of the water has been expelled. The felt accompanies the web through three or four sets of rollers, until it has become sufficiently strong to withstand the strain of the machine. From the drying rollers the paper passes to the calender machine, if there is one, and as it passes from the calender, it is either wound into rolls or cut into sheets, according to the use for which it is intended.

Material. The enormous demand for paper has for many years made it necessary to employ other material than rags, and now wood is very generally used in the manufacture of paper for newspapers and for the cheaper grades of books. With the exception of transforming the wood into pulp, the process of manufacture is the same as that already described. Wood pulp is made by cutting the logs into short lengths, which are split into pieces and ground down on rapidly revolving grindstones, operated by steam or water power. Wood fiber is made by digesting short pieces of wood in boilers containing a dilute solution of sulphuric acid, heated to a high temperature. The pulp and fiber are mixed in proper proportions to give the paper sufficient strength, and after bleaching they pass through the paper machine in the same manner as paper made from rags.

Some of the coarsest grade of paper are made of wheat straw, and other grades are made of Esparto fiber and corn husks. Most of the tissue paper is made from hemp, old ropes being the material generally used.

Varieties. There are many grades and varieties of paper. The best quality is known as *linen* paper; it is generally used for writing paper and for printing bonds and other documents that are to be preserved for a long time. However, scarcely any of the so-called linen paper is made wholly of linen rags; in fact, much of it contains only a small proportion of linen. The ordinary writing paper and most of that used in printing magazines and books is made of a mixture of rags and wood pulp. However, if a large proportion of wood is used, the paper soon turns yellow on exposure to the light. *Manila* paper takes its name from Manila hemp, though much of

the paper so named does not contain any of that material. *Japanese* and *Indian* papers are noted for their peculiar texture, which is due to the method employed in their manufacture. These are usually handmade.

Paraffin paper is made by coating ordinary paper with paraffin. Since it is waterproof it is extensively used for packing articles that should be protected from moisture. *Vegetable parchment* is made by treating common paper with sulphuric acid and other chemcals, then washing and drying. It is strong, flexible and waterproof.

The United States manufactures more paper than any other country, the value of its annual output being about $300,000,000.

Related Articles. Consult the following titles for additional information:

Book	Papyrus
Bookbinding	Printing

PAPIER-MACHE, *pah pyay' mah shay'*, a substance made from paper pulp. It is a tough, light, durable material from which many useful articles are made. The pulp while damp is mixed with glue, resin or other material to make it hold together, and is easily molded into any desired shape. Mixed with quicklime, egg-white or copperas it is waterproof and can be used to make pails, tubs and the like. Papier-mâché is also used for making trays, boxes, dolls' heads, anatomical models and many other articles. It is sometimes used as a substitute for stucco.

PAPINEAU, *pap'pe no'*, Louis Joseph (1789–1871), a Canadian orator and politician, born in Montreal and educated at the seminary in Quebec. He was elected to the assembly of Lower Canada in 1809. He commanded a company of militia during the War of 1812, but saw no real service. In 1815, already recognized as the leader of the French Canadian party, Papineau was elected speaker of the assembly for Lower Canada. In 1820 he was appointed a member of the Executive Council, but resigned in 1823, convinced that he was without influence in that body. He was constantly in opposition to the government and opposed the union of Upper and Lower Canada. The grievances of the French Canadians were many and serious, but they do not seem to have justified the extreme attitude which led Papineau into the open rebellion of 1837. In November, 1837, when Papineau was formally charged with high treason, he fled to the United States to avoid arrest. From 1839 to 1847, when amnesty was granted, Papineau lived in Paris. On his return to Canada he was elected to the lower house of Parliament and continued to demand the "independence of Canada, for the Canadians need never expect justice from England, and to submit to her would be an eternal disgrace." He later led in the agitation for the separation of Upper and Lower Canada, and in 1854 retired from public life.

LOUIS JOSEPH PAPINEAU

PAPRIKA, a condiment prepared from the dried ripened pods of a species of capsicum (which see). Paprika, while having the bright red color of cayenne, is of very mild flavor. It is much used in salads.

PAP'UA. See New Guinea.

PAPY'RUS, a water plant which furnished the material upon which the ancient Egyptians did their writing. The root is very large, hard and creeping, and the triangular stem is several inches in diameter and from twelve to fifteen feet high. Formerly the plant was extensively cultivated in Lower Egypt, but it is now rarely seen there. It grows in other warm parts of Africa, however, and in Sicily and Palestine. The inhabitants of some countries where it grows manufacture it into various useful articles, including sail cloth, cordage, wearing apparel and boats.

PAPYRUS PLANT

The ancient Egyptians used it chiefly for paper, which they prepared from the stems. These were cut in thin strips; the strips were laid side by side lengthwise and then covered with other strips laid across

them. The whole was fastened together by some gummy substance and became under the process a long, tough, smooth mat which could be rolled up or opened at convenience. The writing materials were a reed pen and an ink made of animal charcoal and oil. Thousands of these papyri or papyrus rolls still exist. Many of them were found in the ruins of Herculaneum, but their contents, so far as deciphered, have been of only moderate value. Papyrus was used in Europe till the Middle Ages and was an important export from Egypt. See BOOK; MANUSCRIPTS; PAPER.

PARA, *pah rah'*, or **BE'LEM**, BRAZIL, capital of the province of Para, and one of the greatest rubber markets of the world, is situated on the right bank of the estuary of the Para River, eighty-five miles from the Atlantic Ocean. The principal buildings are the governor's palace, a cathedral and a bishop's palace. There are in the city a lyceum, a seminary, a public library, a botanical garden and a museum. Para has unusually attractive buildings and homes and is one of the most delightful cities in South America. The port, defended by forts, admits vessels of large size. The principal exports of the city are cacao, rubber, Brazil nuts, isinglass, rice and drugs. Other exports are numerous. Population, 1911, estimated at 200,000.

PAR'ABLE, a short fictitious narrative, founded on incidents and facts of every-day life, intended to convey a moral or spiritual truth. The Bible contains numerous parables, which, by reason of their directness and close relation to the lives of the hearers, surpass all others that have been written. One of the best known of those in the Old Testament is the story of the ewe lamb, told by Nathan to David; among those in the New Testament are the parables of the sower, the tares, the mustard seed, the good Samaritan, the prodigal son, the rich man and Lazarus, the ten virgins and the talents.

PARACELSUS, *pair a sel'sus* (1493-1541), a German physician, born and educated in Switzerland. After studying chemistry and medicine in the University of Bâsel and alchemy under the famous bishop of Würzburg, he traveled from place to place, practicing irregularly and gaining a reputation for his cures. From 1526 to 1528 he lectured at the University of Bâsel, and was in the latter year expelled because of drunkenness and other disorderly behavior. It is said that after he had wandered about Europe for several years he was thrown from a window in Salzburg by the servants of a physician to whom he had given offense, and that he died of the fall. Paracelsus did much to explode certain fallacies in medicine, and he laid the foundation for the practice of curing disease by specific remedies. He is one of the classic examples in history of unbalanced genius.

PARACHUTE, *pair a shoot'*, in its simplest form an apparatus of umbrella shape and construction, usually about twenty feet in diameter, attached to balloons or airships, by means of which the aeronaut, or aviator, may descend slowly from a great height. It is shut when carried up, and expands of itself when the aeronaut jumps from his car with the device held aloft above his head and begins to descend; but is not altogether to be depended on. See BALLOON.

The World War developed the flying machine as a military weapon, and a new device was installed by mechanical genius to afford safety to those in machines which became disabled. When descent independent of the airship is necessary, the aviator touched a spring. Compressed air released a folded parachute; it opened instantly by air pressure due to the swiftly-moving airplane. Attached to it by strong cords was the aviator; the parachute in leaving the airship jerked the aviator from his seat and dangled him in midair. Descent was then made in safety, except for danger from fire of the enemy.

PARADISE LOST, an epic poem by John Milton, founded on the Biblical story of the fall of man. It opens with the sufferings of Satan and his crew after their expulsion from heaven. Satan tells his workers of the creation of man; and he calls a council to plan a way to bring about man's undoing. The council meets in Pandemonium Hall, and there it is decided that Satan shall go himself to the newly-created world. The Almighty foresees the fall and, with His Son, plans for man's redemption. Meanwhile Satan has entered the orb of the sun, and has there learned the route to the new world. On entering the Garden of Eden he hears Adam and Eve talking of the forbidden fruit. The Angel Raphael is sent from heaven to tell Adam about Satan and to warn him of his danger. After the angel had departed Satan enters into a serpent and, seeing Eve alone, speaks to her. Eve's astonishment at hearing the

serpent speak is increased when it tells her that it has eaten of the "tree of knowledge" and gained both speech and wisdom. Eve overcome with curiosity, tastes the fruit and induces Adam to eat also. Satan returns to hell elated over his success, and the angel Michael is sent to expel the guilty pair from Paradise. The poem ends with the expulsion and Eve's lamentation. See MILTON, JOHN.

PARAFFIN, *pair'a fin,* a tasteless and odorless waxlike substance, used extensively in making candles. It is obtained from the mineral ozocerite, but chiefly, by distillation, from petroleum. In Germany it is prepared from certain kinds of brown coal, and in Scotland, an important paraffin producer, it is made from boghead coal and certain bituminous shales. In addition to candles, numerous other things are made from paraffin. It is used in the manufacture of wax paper, matches and certain fabrics and extensively as a protective covering for preserved fruits. See HYDROCARBONS; PETROLEUM.

Typical native types

PARAGUAY, *pair'a gway,* or *pah ra gwi',* a South American republic in the interior of the continent, enclosed on all sides by larger countries. Brazil touches it on the north and east, Bolivia adjoins it on the northwest, and Argentina bounds it on all other sides. The exact boundary lines are a matter of dispute, as a great territory comprising about 100,000 square miles, lying between the Paraguay and Pilcomayo rivers, is claimed both by Bolivia and Paraguay. It is, however, usually regarded as a part of Paraguay. Paraguay proper, lying between the Paraguay and Alta (Upper) Parana rivers, has an estimated area of 65,000 square miles. Economically Paraguay has the position of a new country just beginning its development, although its history dates back to the sixteenth century. It is a land of great potential wealth, and apparently has a future holding much promise.

People and Cities. In 1917 the population was estimated at 1,000,000. The native Indian stock, a people known as Guarani, are found chiefly in the rural districts. In the towns and cities people of mixed Spanish, Indian and negro blood are found. There are about 60,000 foreigners in the country, mostly Argentines, Italians, Brazilians, Spaniards, Germans, French, Uruguayans and English. The Guarani are a strong, uncorrupted people, who live simply and adhere to the virtues of their forefathers. They are religious, patriotic and industrious. In the disputed region, which is only partially explored, there are about 50,000 Chaco Indians, who live under the most primitive conditions.

Asuncion, the capital and largest city, had an estimated population of 120,000 in 1917; other towns are Villarica (26,000), Concepcion (15,000), Luque (15,000), and Encarnacion (12,500). These figures are all estimates. The main railway of the country joins Encarnacion and Asuncion, and there is through train service between Asuncion and Buenos Aires, capital of Argentina.

Physical Features. The whole surface belongs to the basins of the Paraguay and Parana rivers, numerous tributaries of which intersect the country. Along the Paraguay and in the south, adjoining the Parana, are extensive swampy tracts; westward of the Paraguay the country is little known. Elsewhere the surface is well diversified with hills and valleys and rich alluvial plains. The climate is agreeable, the mean annual temperature being about 75°.

Production and Industry. The natural fertility of the soil is shown by a vegetation of almost unequaled luxuriance and grandeur. In the forests are found at least sixty varieties of timber trees, besides dye-woods, gums, drugs, perfumes, vegetable oils and fruits. Many of the hills are covered with the *yerba mate,* or Paraguay tea. The larger plains are roamed over by immense herds of cattle, which yield large quantities of hides and tallow; and on all the cultivated alluvial tracts sugar cane, tobacco, rice and maize are raised. The chief imports are textiles, foodstuffs, hardware, fancy goods, chemicals and liquors. The exports include hides, mate, oranges, tobacco, timber, cattle, preserved beef and quebracho extract (medicinal). The United Kingdom is Paraguay's most important overseas customer.

Government and Religion. The executive power is vested in a President, who is elected for four years and is assisted by five Ministers. The legislative department consists of

a Congress comprising a Senate and a House of Deputies, the members of each being chosen by universal suffrage. According to electoral law of 1916, there are twenty Senators and forty Deputies. The Roman Catholic Church is the state Church, but all religions are tolerated.

Education. Education is free and compulsory by law, but not all sections are provided with schools. There are about 1,050 primary schools in the country. High schools, called national colleges, are maintained in six cities.

History. Paraguay was originally a Spanish colony, the first settlement being made in 1535. In 1608 a number of Spanish Jesuits established a powerful and well-organized government, which lasted till 1758, when it was overthrown by the Brazilians and Spaniards. Early in the nineteenth century its isolated position enabled it by a single effort to emancipate itself from Spanish rule. Doctor Francia, secretary to the revolutionary junta in 1811, was elected consul, but exchanged the name for that of dictator in 1814, and thenceforward, by a rigorous system of espionage and the strict prohibition of all intercourse with other nations, he retained his position till his death in 1840. In 1844 Don Carlos Antonio Lopez was elected President for ten years, and soon after, the country was declared free and open, both to foreigners and foreign commerce. Don Carlos Lopez remained President of Paraguay till his death in 1862, when he was succeeded by his son Francisco Solano Lopez, who concluded treaties of commerce with the United States and the leading European nations and did all in his power to promote the growth of agriculture and industry in the land. But a disastrous war with Brazil and the Argentine Republic, which broke out in 1864 and only closed with the death of Lopez in 1870, caused the death of far the greater portion of the male adults and entirely checked the progress of Paraguay. A popular constitutional government was then established, and the nation began the process of reconstruction.

Related Articles. Consult the following titles for additional information:

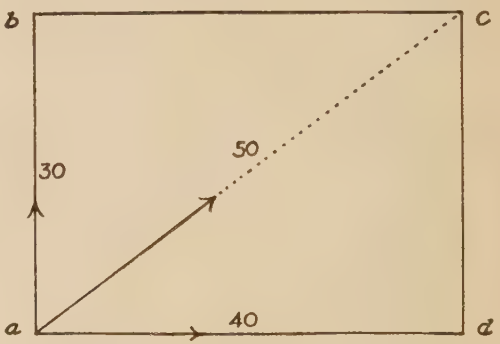
Asuncion — Paraguay (river)
Mate — Parana (river)

PARAGUAY, a river of South America, which is a valuable highway of trade for Paraguay and Brazil. It rises on the plateau of Matto Grosso, in Brazil, flows in a generally southeasterly direction and joins the Parana, after a course of almost 1,500 miles. Asuncion, the thriving commercial capital of Paraguay, is situated on its banks. The Paraguay was discovered by Sebastian Cabot in 1526.

PARAGUAY TEA. See MATE.

PARALLEL'OGRAM. See QUADRILATERAL.

PARALLELOGRAM OF FORCES, an important principle of dynamics, discovered by Newton, which may be stated thus: If two forces, acting in different directions on a body at the same time, be represented in magnitude and direction by two straight lines meeting at the body, their resultant effect, in giving motion to the body, is that of a force represented in magnitude and direction by the diagonal of the parallelogram of which the two former lines are two sides. A body at



a is acted upon by two forces x and y, acting at right angles to each other. Let x have a force of 30 pounds and y a force of 40 pounds. If we construct the diagonal $a\ b\ c\ d$ (see illustration), we shall find that the path of the body is represented by the line $a\ c$, and that is moves with a force equal to 50 pounds. See COMPOSITION OF FORCES.

PARAL'YSIS, the impairment or loss of the power of motion. This loss may affect certain parts of the body only, or it may cover one side of the body, or the upper or the lower half, or it may be general and affect both upper and lower extremities. Sometimes there is a loss of motion, while sensibility is retained; and rarely, there is a loss of sensibility, while the power of motion is retained. Paralysis is not a disease, but is a manifestation of disease, usually in a part of the body remote from that affected by paralysis; as, for instance, a wound or a disease of a nerve trunk may cause paralysis in the extremities to which the trunk leads. The ordinary form

of apoplexy or paralytic stroke is accompanied by a loss of motion on one side of the body, usually in the extremities and in the muscles of the face and tongue. It is frequently caused by the forming of a blood clot in the brain.

Paralysis is sometimes cured by electrical treatments, massage and similar measures, but the treatment in each case depends upon the nature of the ailment. The treatments that are used to remedy paralysis following infantile paralysis and meningitis should be persisted in for months if necessary. See INFANTILE PARALYSIS; MENINGITIS.

PARAMAR'IBO, DUTCH GUIANA, the capital and chief center of trade of the colony, is about sixteen miles above the mouth of the Surinam. It is a well-built city and is the center of the Dutch West Indian trade. Its chief exports are sugar, rum, molasses and rubber. A hospital for lepers is located near the town. Population, 1915, 35,530.

PARANA, *pah rah nah'*, a river of South America, the largest on the continent except the Amazon. It is formed by the union of the Rio Grande and the Paranahyba rivers, and early in its course forms the boundary between Brazil and Paraguay. Sweeping around the southern end of the latter country, it separates it from Argentina, through which it flows in its lower course, and finally discharges into the Plata, an inlet of the Atlantic. About 1,800 miles from its mouth it is joined by the Paraguay, its largest tributary.

It is one of the most important water systems in the world, and its drainage area is nearly equal to that of the Mississippi. Seagoing vessels ascend 400 miles, and smaller steamers 1,000 miles. Several hundred miles from the Plata the Parana begins to divide into two parallel channels, and its total width near its mouth is thirty miles. Above its confluence with the Paraguay the river plunges over a great escarpment—the Falls of Guayra. It then rushes through a deep rocky gorge and is broken by rapids. One of its tributaries, the Iguazzú, enters it at Victoria Falls, a magnificent cataract which rivals Niagara in volume and beauty.

PAR'ASITE, a plant or an animal which attaches itself to some other plant or animal and draws its nourishment therefrom. Some animal parasites such as tapeworms and trichina live on the interior of the body, inhabiting some particular organ; while others, such as ticks, fleas, lice, live on the outside. Among the most destructive of vegetable parasites are smut, which is a good example of internal vegetable parasite, rust and mildew. Parasites are always injurious to the host, or body on which they live, causing depletion of strength and sometimes death. Mistletoe, widely distributed throughout the southern part of the United States, is one of the largest of tree parasites. Dodder, another common vegetable parasite, is injurious to clover and alfalfa. See BOTANY, subhead *Uninvited Guests*.

PARASIT'IC DISEASES, diseases produced by parasitic animals or plants. See BACTERIA AND BACTERIOLOGY; DISEASES OF PLANTS.

PAR'CEL POST, the name given to that branch of the post office system which transmits merchandise and printed matter, except periodicals. In the United States the parcel post was inaugurated on January 1, 1913. The law which authorized this service was passed on August 24, 1912. The parcel post differs from the former fourth class matter in two important particulars: first, in the weight and size of the package and the character of the contents; second in the use of distance as a factor in determining the rate of postage. The old law limited the weight of packages to four pounds and made 1 cent an ounce the rate of postage. The new law provided that packages may weigh not more than 11 pounds, and may not exceed 72 inches in length and girth combined. On August 15, 1913, the weight limit was raised to 20 pounds within the first and second zones, and on January 1, 1918, it was raised to 70 pounds within the first two zones and to 50 pounds in the other zones. All matter, including farm and factory products, not included in the first three classes of mail matter, may be sent by parcel post. Explosives of every kind, intoxicating liquors, live or dead animals, articles having a bad odor, or any articles objectionable in themselves or dangerous to handle will not be received as mail matter.

Ordinary postage stamps are now used to prepay matter, though formerly special stamps were required. Parcels may be sent by special delivery, may be insured, and may be sent collect on delivery. On the next page will be found a table giving the rates for the parcel post from one pound up to seventy pounds:

Weight in pounds	Local	First Zone	Second Zone	Third Zone	Fourth Zone	Fifth Zone	Sixth Zone	Seventh Zone	Eighth Zone
1	$0.05	$0.05	$0.05	$0.06	$0.07	$0.08	$0.09	$0.11	$0.12
2	.06	.06	.06	.08	.11	.14	.17	.21	.24
3	.06	.07	.07	.10	.15	.20	.25	.31	.36
4	.07	.08	.08	.12	.19	.26	.33	.41	.48
5	.07	.09	.09	.14	.23	.32	.41	.51	.60
6	.08	.10	.10	.16	.27	.38	.49	.61	.72
7	.08	.11	.11	.18	.31	.44	.57	.71	.84
8	.09	.12	.12	.20	.35	.50	.65	.81	.96
9	.09	.13	.13	.22	.39	.56	.73	.91	1.08
10	.10	.14	.14	.24	.43	.62	.81	1.01	1.20
11	.10	.15	.15	.26	.47	.68	.89	1.11	1.32
12	.11	.16	.16	.28	.51	.74	.97	1.21	1.44
13	.11	.17	.17	.30	.55	.80	1.05	1.31	1.56
14	.12	.18	.18	.32	.59	.86	1.13	1.41	1.68
15	.12	.19	.19	.34	.63	.92	1.21	1.51	1.80
16	.13	.20	.20	.36	.67	.98	1.29	1.61	1.92
17	.13	.21	.21	.38	.71	1.04	1.37	1.71	2.04
18	.14	.22	.22	.40	.75	1.10	1.45	1.81	2.16
19	.14	.23	.23	.42	.79	1.16	1.53	1.91	2.28
20	.15	.24	.24	.44	.83	1.22	1.61	2.01	2.40
21	.15	.25	.25	.46	.87	1.28	1.69	2.11	2.52
22	.16	.26	.26	.48	.91	1.34	1.77	2.21	2.64
23	.16	.27	.27	.50	.95	1.40	1.85	2.31	2.76
24	.17	.28	.28	.52	.99	1.46	1.93	2.41	2.88
25	.17	.29	.29	.54	1.03	1.52	2.01	2.51	3.00
26	.18	.30	.30	.56	1.07	1.58	2.09	2.61	3.12
27	.18	.31	.31	.58	1.11	1.64	2.17	2.71	3.24
28	.19	.32	.32	.60	1.15	1.70	2.25	2.81	3.36
29	.19	.33	.33	.62	1.19	1.76	2.33	2.91	3.48
30	.20	.34	.34	.64	1.23	1.82	2.41	3.01	3.60
31	.20	.35	.35	.66	1.27	1.88	2.49	3.11	3.72
32	.21	.36	.36	.68	1.31	1.94	2.57	3.21	3.84
33	.21	.37	.37	.70	1.35	2.00	2.65	3.31	3 96
34	.22	.38	.38	.72	1.39	2.06	2.73	3.41	4.08
35	.22	.39	.39	.74	1.43	2.12	2.81	3.51	4.20
36	.23	.40	.40	.76	1.47	2.18	2.89	3.61	4.32
37	.23	.41	.41	.78	1.51	2.24	2.97	3.71	4.44
38	.24	.42	.42	.80	1.55	2.30	3.05	3.81	4.56
39	.24	.43	.43	.82	1.59	2.36	3.13	3.91	4.68
40	.25	.44	.44	.84	1.63	2.42	3.21	4.01	4.80
41	.25	.45	.45	.86	1.67	2.48	3.29	4.11	4.92
42	.26	.46	.46	.88	1.71	2.54	3.37	4.21	5.04
43	.26	.47	.47	.90	1.75	2.60	3.45	4.31	5.16
44	.27	.48	.48	.92	1.79	2.66	3.53	4.41	5.28
45	.27	.49	.49	.94	1.83	2.72	3.61	4.51	5.40
46	.28	.50	.50	.96	1.87	2.78	3.69	4.61	5.52
47	.28	.51	.51	.98	1.91	2.84	3.77	4.71	5.64
48	.29	.52	.52	1.00	1.95	2.90	3.85	4.81	5.76
49	.29	.53	.53	1.02	1.99	2.96	3.93	4.91	5.88
50	.30	.54	.54	1.04	2.03	3.02	4.01	5.01	6.00
51	.30	.55	.55	1.06					
52	.31	.56	.56	1.08					
53	.31	.57	.57	1.10					
54	.32	.58	.58	1.12					
55	.32	.59	.59	1.14					
56	.33	.60	.60	1.16					
57	.33	.61	.61	1.18					
58	.34	.62	.62	1.20					
59	.34	.63	.63	1.22					
60	.35	.64	.64	1.24					
61	.35	.65	.65	1.26					
62	.36	.66	.66	1.28					
63	.36	.67	.67	1.30					
64	.37	.68	.68	1.32					
65	.37	.69	.69	1.34					
66	.38	.70	.70	1.36					
67	.38	.71	.71	1.38					
68	.39	.72	.72	1.40					
69	.39	.73	.73	1.42					
70	.40	.74	.74	1.44					

For parcels above 20 pounds, in the first two zones, the rate increases in the same proportion until the 70 pound limit is reached for those zones.

Parcels are mailable only at main postoffices, branch postoffices and substations.

Beginning March 16, 1914, books were admitted to the parcel post, at the rate of 1 cent for each 2 ounces or fraction thereof on books weighing 8 ounces or less, and at regular zone parcel post rates on those in excess of that weight.

A parcel post system was introduced in Canada early in 1914.

PARCH'MENT, the prepared skin of sheep, goats and other animals, used chiefly as a writing material. The heavy skins of the old animals and of asses are used for making the parchment of drum heads, while the skins of calves, kids and unborn lambs are used for making a superior quality of parchment known commercially as *vellum* and used for rare book-bindings, college diplomas and certain legal documents. The first step in the preparation of parchment is removal of the wool or hair. The skin is then placed in lime to remove the fat, and is afterwards dressed with scrapers and rubbed with pumice stone to give it a uniform surface and thickness.

PAR'DON, the remission of the penalty attached to a crime. In the United States, the pardoning power is lodged in the president and the governors of the various states and extends to all offenses except those which are punished by impeachment after conviction. In some states, concurrence of one of the legislative bodies or a pardoning board is required. In Canada, pardons are granted by the Crown, acting through the Governor-General.

PARENT AND CHILD. Only the legal aspect of this relation is considered in this article. The law requires the parents to care for and educate their children. While, ordinarily, the father is held responsible for the discharge of these duties, they fall upon the mother, if she becomes the head of the family. The parent may punish the child when necessary, but for cruel and unjust punishment he is liable to arrest and prosecution for assault. The parent is usually held liable for debts contracted by the child, but not for his acts. Teachers and guardians, who assume the parents' duties, even temporarily, are considered to be in place of the parent (*in loco parentis*) and are held to have the same authority over the child, for the time it is under their jurisdiction, as the parent. Common law allows the teacher to inflict corporal punishment, but boards of education frequently forbid it. In case of excessive punishment the teacher is liable to arrest on the charge of assault.

PARENT-TEACHER ASSOCIATION, an organization of mothers and teachers inaugurated by the National Congress of Mothers, which met for the first time in February, 1897, at Washington, D. C. (see CONGRESS OF

MOTHERS, NATIONAL). Since that date local parent-teacher associations have been established by hundreds in all parts of the United States. These organizations are branches of the Congress of Mothers; the full title of that organization is National Congress of Mothers and Parent-Teacher Associations. The objects of the parent-teacher associations are:

1. To give fathers and mothers opportunity to study how to develop the highest physical, mental and moral possibilities of their children through study of child nurture and home making.

2. To learn what the school is doing and give intelligent aid to teachers, thus lightening their burden and promoting the welfare of the children.

3. To learn conditions affecting the children outside of home and school, and by united effort awaken the community to its responsibility to the children.

PAR'ESIS, (also pronounced *pa re'sis*) is a nervous disease which begins with such mild symptoms as excitability and a tendency to be irritable, and progresses gradually to a condition of paralysis and insanity. It is more prevalent in males than in females, and occurs most frequently between the ages of thirty-five and forty. The underlying cause is syphilis, but there is usually present a weakened condition due to use of alcohol, mental shock, injury to the head, etc. The course of the disease is usually four years. Death may result from convulsions, exhaustion, hemorrhage of the brain or some complication.

PARHE'LION, a mock sun, having the appearance of the sun itself and seen by the side of that luminary. Parhelia are sometimes double, sometimes triple and sometimes more numerous. They appear at the same height above the horizon as the true sun, and they are always connected with one another by a white circle or halo. They are the result of certain modifications which light undergoes when it falls on crystals of ice, rain drops or minute particles that constitute clouds. See CORONA; HALO.

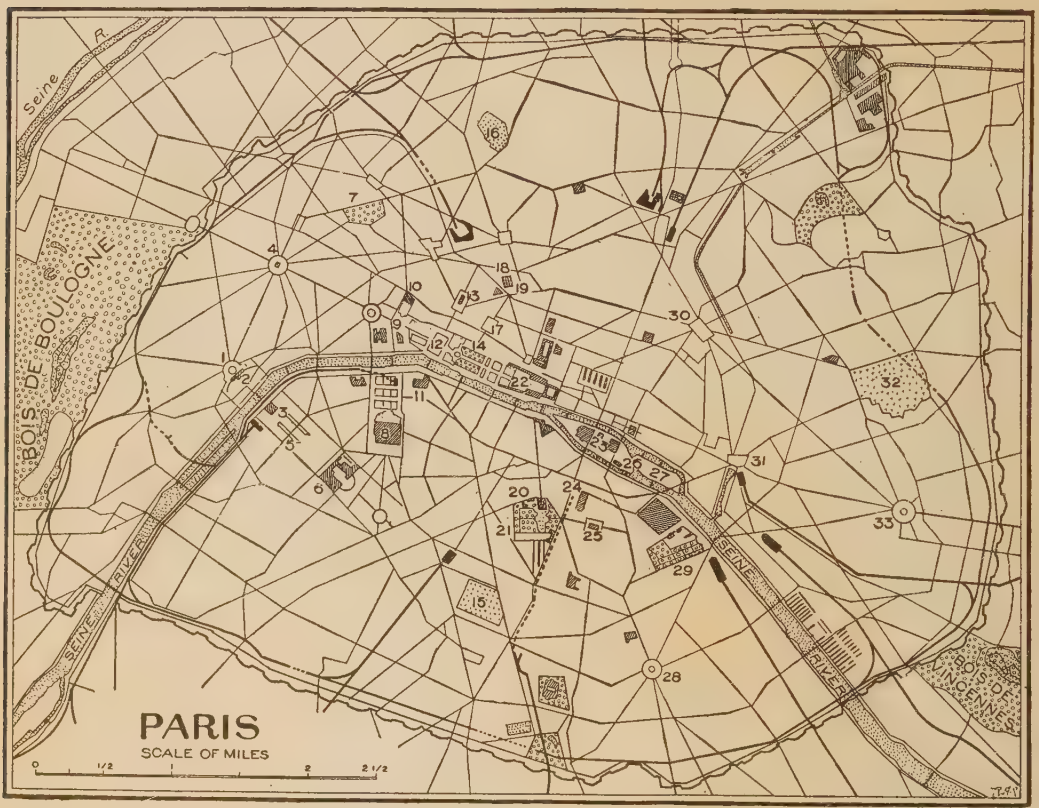
PARIS, in Greek legend, the son of Priam and Hecuba. His mother dreamed before his birth that she had brought forth a firebrand, and having been informed by the priests that this meant that her son should cause the destruction of Troy, she had the child left on Mount Ida to die. Here, however, he was found by a shepherd, who brought him up as his own son. When he grew to young manhood, his great beauty won him the love of the nymph Oenone, whom he married. They were happy together until, one day, Paris was called to decide a beauty contest between Juno, Minerva and Venus, all of whom claimed the apple which, marked "For the fairest," was thrown into their midst (See APPLE OF DISCORD). Each of the goddesses promised to Paris a reward if he would decide in her favor, but the offer of Venus of the most beautiful woman in the world as his wife was most to his taste, and he awarded the prize to her. While on a visit to Greece, Paris was entertained at the home of Menelaus, king of Sparta, whose wife, Helen, the most beautiful woman of her time, he treacherously made love to and carried off. This act caused the Trojan War. After the capture of the city he killed Achilles by shooting him in the heel, and he was himself killed by Philoctetes. See HELEN; TROY.

Arch of Triumph

PARIS, *pair'is*, FRANCE, the beloved *Pa ree'* of all Frenchmen, is the capital and largest city of the republic, and one of the most interesting and most popular cities of the world. In the days before the great war of 1914–1919 it was the most important place on the globe in the minds of those who supply the feminine public with the latest styles in hats and gowns, and it was the Mecca of all pleasure-loving tourists. Art students, too, flocked there in great number, to take advantage of its unrivaled schools, picture galleries and exhibitions. That this Paris of beauty, pleasure and joyous spirit should endure four years of peril and anguish is one of the many ironies created by the World War. On two occasions in gravest danger of being captured, bombarded repeatedly by airships, shelled by a monster gun from a range of seventy-six miles, Paris came triumphantly through its ordeal, and showed the world the strength and devotion to duty that underlie the character of the French people.

Location and Population. The French capital lies on a level plain in the northern part of the country. It is built on both banks of the River Seine, 110 miles in a direct line

from the mouth. Low hills, never more than 420 feet high, encircle the plain and are themselves surrounded by an outer range of elevations, most of them strongly fortified. The elaborate system of fortifications, considered impregnable before the World War, includes a wall erected about the city. Paris is 285 miles southeast of London by way of Dover and Calais, 108 miles southeast of Havre and 358 miles northeast of Bordeaux.



1, Place du Trocadero; 2, Palais du Trocadero; 3, Tour Eiffel; 4, Place de l'Etoile, 5, Champ de Mars; 6, Ecole Militaire; 7, Park Monceau; 8 Hotel des Invalides; 9, Champs Elysées; 10, Palais Elysée; 11, Chambre des Députés; 12, Place de la Concorde; 13, La Madeleine; 14; Jardin des Tuileries; 15, Montparnasse; 16, Montmartre Cemetery; 17, Place Vendome; 18, Opera; 19, Place del'Opera; 20, Palais du Luxembourg; 21, Luxembourg Gardens; 22, Palais du Louvre; 23, Ille de la Cité; 24, Sorbonne; 25 Pantheon; 26, Notre Dame; 27, Ile St. Louis; 28, Place de la Italie; 29, Jardin des Plantes; 30, Place de la Republique; 31, Place de la Bastille; 32, Père Lachaise; 33, Place de la Nation.

In population Paris is the first city on the continent and the third in the world, following London and New York. At the beginning of the nineteenth century the population was about 714,000. In 1880 it had increased to 2,269,000, and in 1911 it was 2,888,110. The French capital is one of the most densely-populated cities in the world, having two and one-half times as many people to the square mile as London. Perhaps one-tenth of the population is composed of foreigners, representing most of the nations of Europe.

General Description. Paris grew without a definite plan, and at one time had a dense population living in crowded houses on narrow, crooked streets. Within the past century, however, the city has been remodeled, wide avenues have been opened in every direction, and communication is rendered direct and easy by numerous street car lines and omnibuses. Besides these, Paris has a system of underground street railways that is as perfect in appointment and management as any in the world. As a whole it is one of the most beautiful cities of the world, and though in its reconstruction thousands of people suffered from the arbitrary opening of streets and the destruction of old buildings, yet the roomy avenues, the perfect sanitation and the magnificent appearance of the new city have

PARIS, FROM THE RIVER SEINE

justified the action of its builders. The Seine is a great thoroughfare for trade and commerce, and its sides are lined with magnificent stone quays, which keep its water within bounds and furnish landing stages and broad esplanades for pleasure and trade. Near the center of the city the Seine divides into two streams and creates the Ile de la Cité, which is covered with fine public buildings. The river, which varies from 300 to 500 feet in width, is spanned by more than thirty magnificent bridges, one of which has been in existence for over 400 years and others for more than 300 years. Many of the bridges are adorned with historical relics or with statuary designed to commemorate great events.

Steam and electric roads connect Paris with its numerous famous suburbs—Boulogne and its famous park and race courses; Versailles, with its palace and beautiful gardens; Saint-Denis, with its cathedral where the kings of France are buried, and a score of others near and farther, each abounding in historic or artistic interest. The railroads which connect Paris with the other cities of Europe are numerous and well equipped. They enter the city from different quarters and terminate in fine stations, all of which are easily reached by the street and underground railways.

Streets, Parks and Boulevards. Paris is famous for its handsome boulevards and streets. There are three circles of boulevards, the inner one, or *Grands Boulevards,* enclosing the oldest section; the next circle surrounds the old suburbs, and beyond this is the boulevard system extending about the newer suburbs. The city is known, too, for its many handsome squares.

In the northwest is the Place de l'Etoile (Place of the Star), whence radiate twelve great avenues. Chief among these is the Champs Elysées, running southeast, under slight changes of direction and name, to the Place de la Bastile. There it meets other diverging streets, one of which continues in the same general direction to the Place de la Nation. The Champs Elysées proper terminates in the Place de la Concorde, which once streamed with the blood of the Revolution. Beyond is the garden of the Tuileries, now the beautiful playground of crowded Paris, and still farther, the Palace of the Louvre, with its wonderful treasures of art and history. Across the river to the south of the Champs Elysées are the spacious grounds of the Hotel des Invalides (a home for old soldiers), which almost meet the Champ de Mars and the wide tract that faces the Palace of the Trocadero, on the north side of the river.

South of the river, also, are the charming gardens of the Luxembourg, and farther east, next the river, is the Jardin des Plantes (botanical garden), with its marvelous living collection of plants from all parts of the world. In the northeastern part of the city is the beautiful park of the Buttes Chaumont, where advantage has been taken of high hills and deep ravines to make a most delightful garden. Just outside of the city, to the west, is the Bois de Boulogne, a magnificent park, much of which is still in its natural state, where great trees shadow acres of hillside, interspersed with meadows, lakes and gardens. Among them all run the beautiful drives and charming walks that have made this park famous for many years. Across the city, at the southeast, is the Bois de Vincennes, a smaller, but almost equally beautiful, tract. The cemetery of Montparnasse, in the southern part of the city, and the cemetery of Père Lachaise, in the east, are beautifully kept and attract many visitors to the graves of the famous people buried there.

Public Buildings, Monuments and Institutions. Paris has long been famed for the magnificence of its churches, palaces and other public buildings. Chief of these is the great Palace of the Louvre, located on the north bank of the Seine, almost in the center of the city. Directly south of it, and some distance from the opposite side of the river, is the Palace of Luxembourg, once a royal residence, but now the home of great collections of modern paintings and statuary. The Palace of the Trocadero fronts the Seine on the north bank. It is a huge orienfal building, in front of which is a great ornamental fountain. The palace was built in 1878 for the International Exposition, and it still contains many treasures of sculpture and ethnology. Across the river are the Eiffel Tower, and the Champ de Mars, where have been erected the buildings for other international expositions. The Hotel des Invalids has been in existence since 1670, and in connection with it is a military museum, with a fine collection of relics. The President of France makes his official home in the Palais

de l'Elysée, northwest of the Place de la Concorde, while across the river, south of the square, is the building of the Chamber of Deputies. On the Ile de la Cité is the Palace of Justice, where the law courts are held; it is famous for its prison, the Conciergerie, within which Marie Antoinette, Robespierre and other famous personages of the Revolution were confined. North of the island is the Hotel de Ville (City Hall). Many other elegant public buildings, including the palaces, schools, hospitals and charitable institutions, are located in different parts of the city.

Among the churches the chief is the Cathedral of Notre Dame, situated on the Ile de la Cité. The Madeleine, a modern structure, is a handsome imitation of a Greek temple, and within, it is gorgeously decorated. The Panthéon, in the form of a Greek cross, is another notable church. The Grand Opera House, which covers nearly three acres of ground, is a magnificent structure that cost about $5,500,000. The chief educational institution is the University of Paris. In the vicinity of the Sorbonne, which was the name of the building occupied by the old University of France, are the College of France, the Schools of Medicine and Law, the Observatory, the Ecole Polytechnic and the Jardin des Plantes. The Bibliotheque Nationale (National Library) contains about 2,600,000 volumes, besides surpassingly great collections of manuscripts, coins and historic relics of various kinds. The art collections of Paris are the pride of France and have been gathered from all parts of Europe. No city surpasses Paris in the value and interest of these collections.

In the parks and public places of Paris are many fine monuments of various kinds. Besides the statuary which has been erected in memory of famous Frenchmen, there are several very pretentious and remarkable monuments that deserve special mention. In the Place de l'Etoile is the largest triumphal arch in existence. As it is located on a slight eminence, it is visible from almost every part of Paris. In the center of the Place Vendome rises a column 142 feet high, built in imitation of Trajan's column at Rome. On it are represented memorable scenes of the wars of 1805, down to the Battle of Austerlitz. At the top is a statue of Napoleon in his imperial robes. The granite obelisk in the center of the Place de la Concorde once stood in front of the gateway to the great Temple of Luxor, in Upper Egypt. In 1831 this was presented to Louis Philippe by Mohammed Ali, then viceroy of Egypt. The monolith, thickly inscribed with hieroglyphics that tell of the exploits of Rameses II, is reddish granite, from the quarries of Assuan, and is seventy-six feet high. It rests on a pedestal of French granite thirteen feet high. The location of the Bastille, the famous old prison which was destroyed in the Revolution, is marked by a bronze column resting on a base which makes the whole monument 154 feet in height.

Government. Paris is under the national government, and its chief executive is the prefect of the Seine, appointed by the government. A town council, of which there are eighty members, four from each of the twenty wards of districts of the city, is chosen by the people. Each of the twenty districts, or *arrondissements*, has a mayor and two assistant councilors and is to a certain extent an independent organization, as it assesses and collects its own taxes and administers most of its ordinary affairs, subject, however, to the control of the municipal council. The city is well regulated and policed, and its streets are kept marvelously neat and clean. Many of the public utilities are owned and operated by the city. The tendency is toward municipal ownership of all. Paris has an excellent school system, which provides for the education of its children from the time they are infants until they have passed through high school and are ready for entrance to university or college. Attendance is not compulsory in all schools, but a certain amount of education is required of every child. The control of so many public enterprises and utilities makes the annual expenses enormous.

Commerce and Industry. Paris has some large manufacturing establishments, and more are coming into existence, but its chief importance has been in the great number of comparatively small factories or workshops, in which small and elegant articles of all kinds are made in the choicest manner. No other city in the word equals Paris in the excellence and varied character of its objects of art and luxury—perfumes, gloves, artificial flowers, toys, jewelry, botanical and surgical instruments and a host of articles that a luxury-loving world enjoys. Paris is the commercial metropolis of France and has an enormous trade in manufactured articles

with the rest of the world. Its stores, many of which are large and on the department plan, are filled with choice articles, which are bought not only by Parisians but by visitors from all over the world, for Paris is and long has been the center of tourist travel from everywhere.

History. A village of the Gauls was located on the present site of Paris as early as the time of Julius Caesar, for he mentions it in his *Commentaries*. About A. D. 250 Saint Denis introduced Christianity among the Gauls, and by the fourth century the name *Paris* had taken the place of *Lutetia*, the name of the village before that time. It was not until the sixth century that Paris was chosen by Clovis as the seat of his government. After the tenth century, when Hugh Capet chose it as the capital of the French monarchy, Paris continued steadily to grow in influence and importance. Many of the kings of France contributed to the embellishment of the city, building bridges and quays and establishing palaces and buildings for the treasures of art and literature. The numerous revolutions which marred its progress resulted in the destruction of some notable buildings, but, in spite of all, the city never appeared to go backwards, and even the destructive revolutions appeared to lend themselves to improvements, convenience and beauty. The occupation of Paris by the Germans in 1871 was a great blow to the pride of the French, but after the evacuation, Paris rapidly regained its influence as the capital of cosmopolitan Europe.

In 1914 the Germans reached Lagny, only seventeen miles from Paris, before they were driven back in the Battle of the Marne. The second Marne battle, fought in 1918, saved the city again, and it was soon relieved of all peril of capture. The terrible bombardment from the long-range gun caused considerable damage, but the finest buildings and monuments were protected by sand bags and other barricades. The sittings of the peace conference were held in the city in the Ministry of Foreign Affairs, across the Seine from the Place de la Concorde, but the final treaty was signed in the suburb of Versailles, in the same room in which William I was crowned first emperor of Germany.

Related Articles. Consult the following titles for additional information:

Arch of Triumph
Bastille
Bibliotheque Nationale of
Champs Elysées
Notre Dame, Cathedral of
Eiffel Tower
Louvre
Salon, The Paris
Seine
Versailles
Versailles, Palace of
World War

PARIS, Louis Albert Philippe d'Orleans, Count of (1838–1894), son of the duke of New Orleans and grandson of Louis Philippe. His father died in 1842, and he thus became heir apparent to the throne. During the American Civil War of 1861, he volunteered in the Northern army and served for some time on the staff of General McClellan. Returning to France he became a member of the National Assembly, but the Expulsion Act of 1886 compelled him to leave France. He died in England.

PARIS, Tex., the county seat of Lamar County, 100 miles northeast of Dallas, on the Gulf, Colorado & Santa Fe, the Texas Midland, the Texas & Pacific and the Paris & Mount Pleasant railroads. The city is in a rich farming region, producing cotton, corn, oats and alfalfa. It contains cottonseed oil mills and oil refineries, a furniture factory, brick works and other enterprises. The city has a fine Federal building, a hospital, a county courthouse, a sanitarium and a country club, and a poor-farm. The place was settled in 1841. Population, 1910, 11,269; in 1917, 12,663 (Federal estimate).

PARIS, Treaties of. The name given to the important treaties of peace concluded at Paris.

Treaty of 1763, the treaty signed on February 10 by France and Spain on the one side and England and Portugal on the other, at the close of the Seven Years' War (which see). By its terms Canada, Prince Edward Island, Cape Breton and French territory (except New Orleans) east of the Mississippi were ceded to England. France retained a share in the fisheries of New Foundland and the Saint Lawrence, and possession of two small islands. The English claim to Nova Scotia was confirmed and Britain's supremacy in India was established. France ceded New Orleans and all the country west of the Mississippi to Spain, and Spain gave Florida to England. The effect of the treaty was to strengthen England at the expense of France and make it supreme in America, in India and on the sea.

Treaty of 1783, the treaty which came at the close of the American Revolution. According to this treaty, which was signed on September 3 by Franklin, Jay and Adams, the United States was recognized for the fir-

time as an independent nation, with territory extending from the Atlantic to the Mississippi, and from the Gulf of Mexico to the forty-fifth parallel. The fishing rights of the United States also were recognized.

Treaty of 1814, signed on May 30, after the first abdication of Napoleon, by representatives of France, on the one hand, and of all the European powers opposed to him, on the other. By this treaty France lost all conquered territory except a small part on its northern and eastern frontiers, but regained most of its colonies. Holland was restored to the House of Orange, and of the conquered colonial possessions Ceylon, the Cape of Good Hope and part of Guiana were retained by England. The independence of Switzerland was confirmed, and Italy and Germany were recognized as aggregations of independent states.

Treaty of 1815, concluded on November 20 after the defeat of Napoleon at Waterloo, between France and the European allies. It modified the treaty of 1814, by divesting France of the frontier territory gained by the preceding treaty, and it placed upon France an indemnity of $200,000,000.

Treaty of 1856, signed March 30 by the great Powers at the close of the Crimean War. It opened the Black Sea to merchant craft of every nation and closed it to all war vessels. The Danube was placed in control of an international commission and declared open to all navigation. The independence of Turkey was recognized, and the Russian protectorate over Wallachia and Moldavia was withdrawn.

Treaty of 1898, signed December 10, terminating the Spanish-American War. Spain evacuated Cuba and ceded to the United States the Philippine Islands, Guam and Porto Rico, and received in return $20,000,000.

Treaty of 1919. Preliminaries respecting peace after the World War were arranged in Paris, but the formal meetings between allied and American representations and enemy delegates occurred in Versailles. See VERSAILLES, TREATY OF.

PARIS, UNIVERSITY OF, one of the oldest and largest universities in the world, located in Paris. It had its origin in a number of schools which became prominent during the twelfth century. Because of a serious conflict which arose between the students and citizens in 1229, a large number of students emigrated to Oxford, but two years later the old differences were settled through the influence of Pope Gregory IX, and most of the students returned. From this time on the university rapidly gained in influence. It attained its highest development during the fourteenth and fifteenth centuries, when it was the educational center of Europe and of the Christian world as well. Its decline was due to the establishment of schools of theology in other parts of Europe and to the political dissensions which culminated in the French Revolution. During this struggle the institution was overthrown, but it was reorganized by Napoleon in 1808.

The present organization includes the faculties of law, medicine, Protestant theology, science, letters and pharmacy. The faculties of science and letters are established at the Sorbonne (which see). Before the World War the attendance was over 17,000. There are nearly 1,000,000 books and manuscripts in the university libraries.

PARIS GREEN, a very poisonous green powder made from arsenic acid and copper acetate. It is chiefly used for killing animal pests injurious to plants. The powder can be sprayed on plants dry or mixed with water. It does not dissolve in water, and must be kept in suspension by constant stirring.

PARK'ER, ALTON BROOKS (1852–), an American lawyer, jurist and politician, born at Cortland, N. Y., educated at the public schools, the Cortland Academy, Cortland Normal School and the Albany Law School, and admitted to the bar in Kingston, N. Y. He became justice of the New York supreme court in 1885, and four years later a member of the court of appeals. In 1898 he was raised to the position of chief justice of that court. In 1904 he was the Democratic nominee for President of the United States, but was defeated by Theodore Roosevelt, and he returned to the practice of law. In 1913 he acted as chief counsel for the plaintiff in the impeachment case of Governor Sulzer.

PARKER, FRANCIS WAYLAND (1837–1902), an American educator, born at Bedford, N. H. He was educated there and also studied at the University of Berlin. Returning to America, he taught for a time, and fought in the Union army in the Civil War, rising to the rank of colonel. In 1886 he was made principal of the Cook County (Illinois) Normal School (after 1896 the Chi-

cago Normal School). Three years afterward he became president of the Chicago Institute (a school founded by Mrs. Emmons Blaine), remaining there until his death. Colonel Parker was one of the leaders in the advanced educational movement in the United States. He was opposed to all formalism in teaching and was an advocate of what he termed a natural method. He was the author of *Talks on Teaching, How to Study Geography* and *Talks on Pedagogy.*

PARKER, GILBERT, Sir (1862-), a Canadian novelist and politician, was born at Belleville, Ont., and educated at Trinity College, Toronto. In 1886 he went to Australia and became one of the editors of the *Sydney Morning Herald.* In the early nineties he began to make a reputation as a writer of romantic fiction. By far the best of his novels are those in which he deals with the history and life of the French-Canadians; it is on his Canadian stories, such as *Pierre and His People, The Trail of the Sword, An Adventurer of the North* and *The Right of Way* that his literary reputation rests. His principal later books are *World in the Crucible, Donovan Pasha, The Weavers, Northern Lights, The Battle of the Strong* and *Wild Youth* (1919). In 1896 he removed to London, and in 1900 he was elected to the British House of Commons, soon becoming a leader in the Unionist party.

GILBERT PARKER

PAR'KERSBURG, W. VA., the county seat of Wood County, about 100 miles southwest of Wheeling, on the Ohio River, at the mouth of the Little Kanawha, and on the Baltimore & Ohio Railroad. The city is in a fertile agricultural region and has a considerable trade. There are also oil and gas wells, coal mines, clay beds and several medicinal springs. The various industrial establishments include steel making, tool works, porcelain manufacture and lumber mills. There are over eighty factories. The city is regularly laid out from the water's edge of both rivers. A railroad bridge, one and one-third miles long, crosses the Ohio, and the city has a park, a Carnegie Library, and three hospitals. Some of the prominent structures are the Academy of Visitation, a Federal building, a courthouse and a city hall. Near the city is the island where Harman Blennerhassett once lived (see BLENNERHASSETT, HARMAN). Parkersburg was settled in 1773 and was chartered as a city in 1863. The commission form of government was adopted in 1911. Population, 1910, 17,842; in 1917, 21,059 (Federal estimate).

PARKMAN, FRANCIS (1823–1893), an American historian, born in Boston and graduated at Harvard in 1844. Determining to write an account of the struggle between France and Great Britain for dominion in North America, he went west to experience pioneer life and to study the Indians. The hardships he endured injured his health, yet in spite of this and defective sight, Parkman worked his way to recognition as an authority on the period of the rise and fall of French dominion in America. He paid five visits to France to examine archives for his purpose. Among his books are *California and the Oregon Trail; The Conspiracy of Pontiac; France and England in the New World; The Jesuits in North America; LaSalle and the Discovery of the Great West; The Old Régime in Canada; Count Frontenac and New France under Louis XIV; A Half Century of Conflict* and *Montcalm and Wolfe.*

FRANCIS PARKMAN

PARKS, NATIONAL, reservations set apart by national governments because of great scenic beauty or other features that make them of interest to the general public and worthy of being protected. The United States and Canada are the only nations which have created such parks on a large scale. Both of these countries control thousands of square miles of land characterized by magnificient scenery or covered with splendid forests that should be preserved from exploitation. These areas are described in the subheads below.

Parks of the United States. Up to January 1, 1919, the government of the United States had created eighteen national parks, under supervision of the Secretary of the Interior. They are as follows:

Casa Grande Ruin, one of the most interesting of North American antiquities, located on a reservation in the valley of the Gila River, near Florence, Ariz. The Ruin is a huge adobe structure built by prehistoric Indians. The reservation, consisting of 480 acres, came under government supervision by Presidential proclamation in June, 1892. It is about ten miles from the main lines of the Arizona Eastern and the Southern Pacific railways.

Crater Lake National Park, in the Cascade Range, Klamath County, Ore., is a reservation of 159,360 acres. In the center of the park is an extinct volcano, the crater of which is the bed of a lake six miles long and four miles wide. On all sides of this beautiful sheet of bluest water, towering walls rise steeply to a maximum height of 2,000 feet. The surface of the lake is 6,177 feet above the sea, and the depth is over 2,000 feet. The reservation was created in 1902. It may be reached from Klamath Falls or from Medford on the Southern Pacific Railroad. Fishing is permitted, as the lake has been stocked by the government with rainbow trout.

General Grant National Park, of 2,560 acres, is in Fresno and Tulare counties, Calif. It is near Sequoia Park and has the same combination of forest and mountain scenery, the chief point of interest being the giant sequoia, General Grant Tree. The park was created in 1890. It may be reached from Sanger, on the Southern Pacific.

Glacier National Park. See article under that heading.

Hawaii National Park consists of reserves on two islands of the Hawaiian group—Hawaii and Maui. On the former are Mauna Loa, the largest active volcano on the globe, and Mauna Kea, a burnt-out volcano, the highest peak in the Pacific Islands. On Maui is a wonderful extinct crater known as Haleakala. (For detailed description see the article Travels in Distant Lands, subhead Hawaii.) Hawaii National Park was authorized August 1, 1916. It contains 74,935 acres.

Hot Springs Reservation, the first national park created. It is a tract of land in Garland County, Ark., covering 912 acres. The present boundaries were fixed in 1880, but the reserve was set aside by legislation in 1832. On the reservation there are forty-six hot springs, the waters of which are piped to a score of bathhouses. A hospital for soldiers and sailors is operated here by the War Department. The reservation is near Little Rock, and is coextensive with the city of Hot Springs.

Lafayette National Park, created in September, 1918, was the first national park established in the Eastern United States. This park is the mountainous island of Mount Desert, off the southern coast of Maine, forming part of Hancock County. On it is the famous resort of Bar Harbor. The park is appropiately named, for it embraces lands that were once owned by France, and it was established in the same year that the United States aided its sister republic in repelling the invaders from the soil of France. The island is fourteen miles long and seven wide, and is noted for its combination of mountain, lake and ocean scenery.

Lassen Volcanic National Park, containing the only active volcano in the United States proper, is in California, in the southern end of the Cascade Range. The park was created in August, 1916, and contains 82,880 acres. Features of interest, besides the volcano, include hot springs, mud geysers, ice caves, canyons and forests. It is forty-five miles east of the Southern Pacific's line between San Francisco and Portland.

Mesa Verde National Park, in the extreme southwestern part of Colorado, is interesting because of its prehistoric relics, particularly ruins of the Cliff Dwellers. It was established in 1906, and covers 42,376 acres. The name Mesa Verde means green table; the park lies on a tablelike plateau of picturesque beauty. It is reached from Mancos on the Rio Grande Southern.

Mount McKinley National Park, a reserve of 2,200 square miles in the south-central part of Alaska, containing the gigantic Mount McKinley, the loftiest peak in North America. The park is a region of wild and picturesque aspect, characterized by forests, glaciers, lakes and mountains. It is to be kept a reserve for wild animal life. The park was created in February, 1917.

Mount Rainier National Park, named for the noble mountain between Seattle and Tacoma, Wash., was established in 1899. It covers 207,360 acres, and is remarkable for the great glacial system that branches in all directions from Mount Rainier. This is the largest glacial system in the United States having a single peak as its center. There are acres of beautiful wild flowers about the mountain, the fields of which approach close to the ice barrier.

Platt National Park, covering 848 acres, is a tract in Murray County, Okla., established a national park in 1906. It is noted for its many sulphur springs, which have medicinal value. Platt Park is reached by branches of the Frisco and the Santa Fe railroad systems.

Rocky Mountain National Park, in Grand, Boulder and Larimer counties, Colo., is one of the most accessible and best known of the great national reservations. It is but fifty miles northwest of Denver, and a comfortable train journey west of Chicago. The 230,000 acres of superb mountain scenery were created a national park in 1915. The park contains Longs Peak and part of the main range of the Rockies, and on its eastern edge it is 8,000 feet in altitude.

Sequoia National Park, containing the famous "Big Trees" of California, is a tract of 160,000 acres in Tulare County. Besides the forest of giant sequoias, one may see here magnificent mountain scenery, and on the eastern side of the park lofty Mount Whitney, the highest peak in the United States. One may reach the park by way of the Santa Fe or the Southern Pacific. It was established in 1890.

Sully's Hill National Park, on the shore of Devils Lake, N. D., was created in 1904. It contains 960 acres, and consists of a wooded tract having some interesting prehistoric ruins.

Wind Cave National Park, created in 1903, consists of a canyon and a cave system in the Black Hills region of South Dakota. It is twelve miles from Hot Springs, on the North Western and the Burlington roads, and is 10,522 acres in extent.

Yellowstone National Park. See article under that heading.

Yosemite National Park. See Yosemite National Park and Valley.

Parks of Canada. The eleven national parks of Canada are administered by a branch of the Department of the Interior. They are as follows:

Battlefields National Park, two historic places purchased by the Dominion and Quebec governments and made a national park at the Tercentenary of the founding of Quebec, in 1908. These spots of historic interest are the Plains of Abraham (now a part of the city of Quebec), where the French forces under Montcalm were defeated by the British under Wolfe; and the battlefield of Saint Foy, located near the city.

Buffalo Park, consisting of 159 square miles, is the largest buffalo reservation in North America. It was authorized in 1907. The park is a tract of prairie land near Wainwright, Alberta, on the main line of the Grand Trunk Pacific. There are more than 2,000 buffaloes in the herd.

Elk Island Park, about forty miles east of Edmonton, Alberta, is a tract of sixteen square miles kept as a game reserve. It was set aside in 1899, and contains, besides elk, large numbers of buffalo, moose, deer and wild birds.

Fort Howe Park, on the site of an historic fort which aided in the defense of Canada during the American Revolution. It is located at Saint John, N. B., and covers nineteen acres. The park was established in 1913.

Glacier Park, a magnificent tract of 468 square miles in British Columbia, was opened in 1886. Among its many interesting ice fields is the well-known Illecillewaet Glacier, which may be reached by way of the Canadian Pacific.

Jasper Park, covering 4,400 square miles, is the largest national park on the continent, and one of the most beautiful areas of the eastern slope of the Canadian Rockies. It was authorized in 1907 and increased to its present dimensions in 1914. The park is in Alberta, and may be reached from the main lines of the Grand Trunk Pacific and the Canadian Northern.

Maple Creek Antelope Reserve, in Saskatchewan, covers twenty square miles. It was set apart in 1914 as a reservation for the pronghorn, or American antelope.

Saint Lawrence Islands Park, consisting of twelve islands in the Saint Lawrence River, covers 140 acres of attractive resort land. It was authorized in 1905.

Rocky Mountains Park, in the western part of Alberta, lies north of Glacier National Park in the United States, and is well known to American tourists. It contains the famous Lake Louise and many other scenic attractions of the beautiful Canadian Rockies. The park was created in 1885 and contains 2,791 square miles. It is on the main line of the Canadian Pacific.

Waterton Lakes Park, covering 423 square miles of mountainous country in Alberta, was established in 1895 and given its present boundaries in 1914. It adjoins the Glacier Park of the United States, and is reached by carriage road from Pincher or Cardston, both of which are on branch lines of the Canadian Pacific.

Yoho Park, another tract of forest and mountain country, adjoins Rocky Mountains Park. It is reached from Field, B. C. The park covers 560 square miles, and has much superb scenery, including beautiful Emerald Lake and Yoho Valley, famed for its waterfalls.

PARLEMENT, *pahr le maN',* the name assumed by a number of local bodies in France prior to the Revolution. The most important was the Parlement of Paris, which was the result of a long evolution from a body which originated in the times of the earliest Frankish kings. There were others at many of the leading cities. The functions of the parlement were chiefly judicial, though they had a sort of legislative and administrative power, as well. Parlements became the center of opposition to the ruling kings and were especially influential in the reigns of Louis XI and Louis XIV. Louis XV abolished the Parlement of Paris and constituted a new and somewhat different body, but the old organization was revived under Louis XVI. The Parlement of Paris and the local parlements were all abolished by the National Assembly in 1790. Their historical importance lies in their influence upon later judiciary tribunals in France and throughout the world. They did much to summarize and unify the common law, and, in dispensing justice, were notably free from prejudice and party influence.

PARLIAMENT, *pahr'li ment,* a word most closely associated with the legislative branch of a government, particularly with those of Great Britain and its dependencies.

In Great Britain the Parliament is composed of two houses, the House of Lords and the House of Commons. The membership of the former comprises *lords temporal,* that is, the hereditary peers and others elevated

from time to time by the Crown, and the *lords spiritual,* or clergy of the established Church. The House of Commons consists of representatives chosen by all the people, and is quite like the House of Representatives in the United States Congress. The House of Lords is in some respects like the American Senate. The authority of Parliament extends in a direct manner over Great Britain, and in lesser degree over the overseas dominions. The subject is further discussed under the title GREAT BRITAIN, subhead *Government.*

The Dominion Parliament. The British North America Act (which see) declares that the legislative department shall be called the Parliament of Canada, and that this Parliament shall consist of a Senate and a House of Commons. In this respect the framers of the constitution patterned after the English government where the law-making department consists of two houses, the House of Lords and the House of Commons. The theory of the bi-cameral (that is, "two chambers" or houses) system is this: if there were only one House it might pass some harmful legislation, either through haste, popular excitement, or under influence of powerful forces; if there were a second House acting

FIRST PARLIAMENT BUILDINGS, TORONTO, 1796–1813

with the first, it would be improbable that the same influences should exist in both, and one House would doubtless correct the influence of the other. Then, too, if one House were in some sense higher grade than the other, its restrictive influence inevitably would be the greater.

The Senate. The Senate was originally composed of seventy-two members, twenty-four each from the three great divisions of Canada—the maritime provinces, Ontario and Quebec—with the hope of affording special protection to their representative interests. Since 1867 the entrance of other provinces has made necessary readjustments of the number from each division, so that the total membership is now ninety-two. The senators are appointed by the Governor-General, with the advice and recommendation of the Privy Council (the official title of the Cabinet). Thus it happens, as in Great Britain, that the political party in control nominates the members of the Upper House. The fact that they are independent of the vote of the people at large is supposed to render them free from local influence. A Senator must be thirty years of age, and have real and personal property worth $4,000 above his liabilities in the province for which he is appointed. The appointment is for life. In legislation the Senate has the same powers as the House of Commons, except in regard to bills imposing taxes or appropriating money. Financial measures must originate in the lower house, and the Senate cannot amend them.

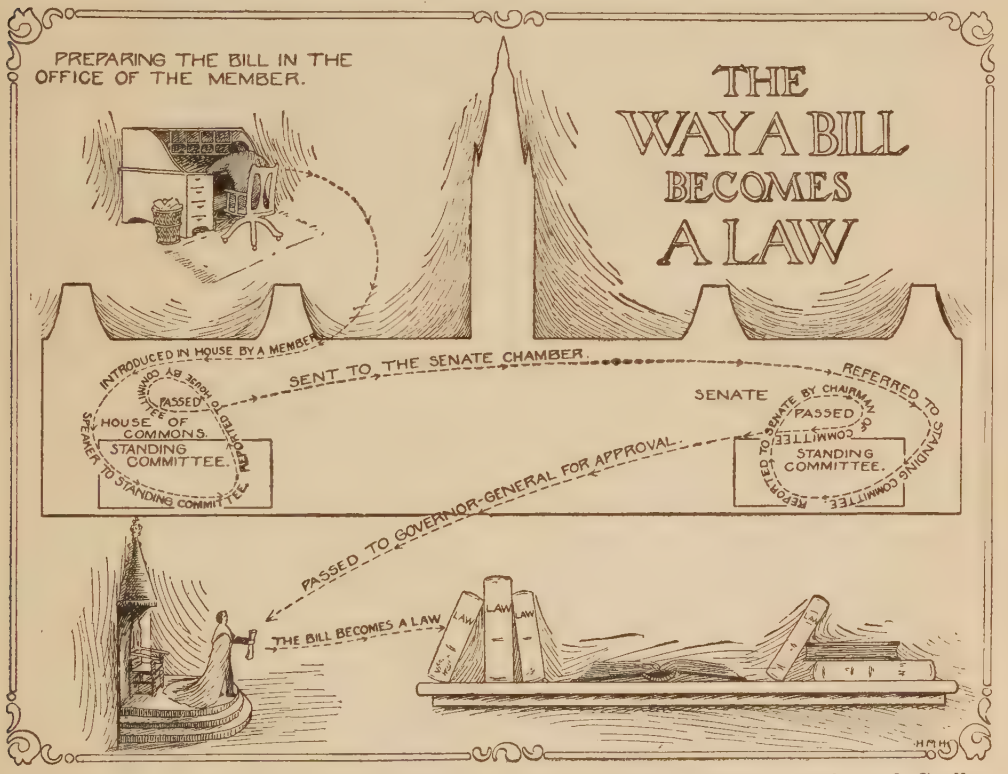
House of Commons. The real political power rests in the House of Commons, elected by manhood suffrage. No Ministry can remain in office without its support and confidence. The British North America Act provides that the province of Quebec must have a fixed representation of sixty-five members, and each of the other provinces has a number bearing the same proportion to its population as sixty-five is to the population of Quebec. The population of Quebec in 1911 was 2,002,712, by dividing this total by sixty-five, we find that the province has one representative for 30,780 inhabitants. The population of any province divided by 30,780 gives the number of its representatives in the lower House. The basis of representation is changed after each decennial census. The next apportionment will occur after the census of 1921.

No property qualification is required for membership. A member must be a British subject by birth or naturalization, and must be of legal age.

All members of Parliament receive an allowance of $2,500 if the session exceeds thirty days in length, and an additional ten cents per mile for traveling expenses. The recognized leader of the opposition in the House of Commons, in addition to his sessional allowance, receives a salary of $7,000 a year.

Officers of Parliament. Each House of Parliament must have an officer to preside over its deliberations; this officer is the *speaker.* The term "speaker" comes directly to us

from the English system of government, and the name of this officer could not be changed, except by amendment of the Constitution. The speaker of the Senate is appointed by the Governor-General; the speaker of the House of Commons is elected by the members; he is assisted by the deputy-speaker, also elected, who presides in the absence of the speaker or in case of a vacancy. In each House there is a clerk or chief officer (appointed by the Governor-General in council) under whose direction a large number of clerks write the journals, attend committees, translate the public documents, etc. All debates are reported by an official body of reporters. French or English may be used in addressing either House, and both must be used in all



the laws and records. The sergeant-at-arms has charge of the messengers and pages, and looks after the furniture of the House and offices. The Senate also has a "gentleman usher of the black rod," who summons the Commons to meet the Governor-General in the senate chamber at the beginning or end of the session.

Electoral Districts. In order that the Members of the House of Commons chosen from any one province may represent every part of the province, the provinces have been divided into electoral districts as nearly equal in population as possible. If the census shows that Alberta may send twelve representatives (as at present), the province is divided into twelve districts or "constituencies," each of which is entitled to one representative. It is not necessary by law that a man so chosen be a resident of the district, but in practice the voters prefer a man who resides in the district to a man who lives several hundred miles away and knows nothing of local conditions.

How Elections Are Held. General elections are held on the same day throughout the Dominion, except in several large and remote districts, such as Yale and Cariboo in British Columbia, where the returning officers fix the day so that all voters may have a reasonable chance to vote. When a general election has been decided on at a Cabinet meeting, the Premier so advises the Governor-General and Parliament is then *dissolved* by a proclamation in the name of the king, who alone has the power to summon, prorogue or dissolve it. A second proclama-

POWERS OF PARLIAMENT AND OF THE PROVINCES

The constitution definitely prescribes what powers are granted to the provincial governments. It also enumerates some of the more important powers of the Dominion Parliament as well as those powers that are prohibited or in whose use Parliament is restricted.

The following outline explains the three divisions:

1. **Powers of the Provinces**
   - (1) The amendment, from time to time, notwithstanding anything in the British North America Act, of the constitution of the province
   - (2) Direct taxation within the provinces to raise revenue
   - (3) Borrowing of money on the credit of the province
   - (4) The establishment of provincial offices
   - (5) The establishment and maintenance of reform and penal institutions, as well as hospitals, asylums and charitable institutions
   - (6) Control of their municipal institutions
   - (7) All licenses controlled by each province
   - (8) Control of public local works
   - (9) Guarantee of property and civil rights in the provinces
   - (10) Administration of justice
   - (11) Authority over matters of a local or private nature
   - (12) Education

2. **Powers of Parliament Extend to**
   - (1) Public debt and property
   - (2) Regulation of trade and commerce
   - (3) Raising of money by any system of taxation
   - (4) Postal service
   - (5) Census and statistics
   - (6) Military and naval service and defence
   - (7) Navigation and shipping
   - (8) Sea-coast and inland fisheries
   - (9) Currency, coinage and banking
   - (10) Weights and measures
   - (11) Patents and copyrights
   - (12) Bankruptcy and insolvency
   - (13) Indians and Indian lands
   - (14) Marriage and divorce
   - (15) Criminal law and penitentiaries

3. **Powers Prohibited or Restricted**
   - (1) Appropriation of money or taxation except on the recommendation of the Governor-General
   - (2) Treaties with foreign nations

tion authorizes the writs of election or order to each district officer, announcing the date for nomination of candidates. As a general rule the election takes place on the seventh day after nomination. If the party in control is returned to power, no changes are necessary in the officers of Parliament, in the cabinet or in the character of legislation. If the opposition wins at the election the system of a responsible Ministry necessitates the resignation of the existing Cabinet and the formation of a new Cabinet by the victors. General elections must be held at least once in five years, but they may be held oftener at the discretion of the Governor-General in council. A by-election is one in which a seat, which has become vacant for some reason, must be filled. A by-election may be important as registering changes in popular opinion or as forecasting the result of the next general election; ordinarily, however, it is only of local interest.

How a Bill Becomes a Law. A formal statement of a proposed law or act is called a "bill," and under this name is introduced into the Senate or House of Commons. Bills may originate in either House, except that financial measures of every kind must come from the House of Commons and the Senate cannot amend them. To become a law a bill must pass both Houses of Parliament and be approved by the Governor-General as the representative of the king. The voting is by yeas and nays, those in favor saying yea, those opposed, nay. If the vote is close, a roll-call or *division* is taken. After being passed by Parliament and approved by the Governor-General the bill is called an act.

Committees of Parliament. A great many thousand bills are introduced into Parliament at each session and it is manifestly impossible for the Houses in open session to give consideration to even a very small portion of them. Standing committees are therefore named in each House whose duty it is to give particular consideration to such proposed legislation as shall be referred to them. For instance, a bill proposing that certain changes be made in the banking laws would be sent in each House to the committee on banking. After a committee has given a bill due consideration, it reports to the House in regular session the result of its deliberations and either suggests that the House pass the bill, or that it be not passed. The recommendation of a committee is usually

accepted, although this is not the invariable rule.

In addition to the standing committees, select or special committees are appointed to consider private bills and such bills as do not fall within the province of the standing committees. All bills must be read three times in each House, as well as considered in the committee of the whole. After a bill has passed one House and goes into the other, the second House may amend it should it so desire (except that the Senate may not amend financial bills); in this case the bill must be returned in its amended form to the House in which it originated. Each House must agree to amendments proposed by the other House. If the two Houses cannot agree as to the final form of a bill, the bill is dropped for the session.

The Budget. The most important power of the House of Commons is the control of financial affairs. The committee of supply, at the beginning of the session, brings a message from the Governor-General with the estimates of the sums required for the government for the next financial year, from the 1st of July to the next 30th of June. These estimates contain the expenditures for the current and the previous year in parallel columns and it is the duty of the minister responsible for expenditures for his department to give full explanations if they are demanded in the House. When the estimates have been formally laid before the House it is the duty of the Minister of Finance to make his financial statement, that is to present the *budget*. This familiar word is an old French word for "bag"; in making his statement the Minister opens the money bag, shows how it should be filled and what should be done with the contents. The debate that follows the delivery of the Minister's speech is sure to be one of the most important of the session. The committee of supply continues to recommend expenditures; when these have all been adopted by the House, the committee of ways and means reports a supply or appropriation bill which is a formal ratification of the work of the committees and shows how the money for the appropriations shall be raised and spent.

PARLIAMENTARY LAW, the system of rules by which deliberative bodies are organized and conducted. The purpose of these rules is to facilitate the transaction of business and to secure the free and orderly discussion of questions. This is the day of organizations, and every person should possess such a knowledge of parliamentary law as will enable him to discharge in an acceptable manner the duties of any office to which he may be chosen in the organization of which he is a member. Moreover, a knowledge of parliamentary law is essential to success in public life.

The fundamental principles of parliamentary law are universal in their application, and we find the business of all organized bodies transacted along practically the same lines of procedure. In addition to these fundamental principles, however, each organization has its own rules and regulations, which constitute its constitution and by-laws.

The constitution usually states the purposes of the organization, fixes the qualifications for membership, specifies the number and duties of the officers and fixes the time of regular meetings.

The by-laws state the order of business, include directions for transacting the business of the organization, fix the dues of members, and specify how bills of the organization shall be paid.

Organizing a Society. The customary method of organizing a society is for those interested to call a preliminary meeting. It is proper for anyone to call this first meeting to order and preside until a temporary chairman is elected. The temporary chairman should call for the election of a temporary secretary. When this has been done a temporary organization has been completed.

The next step is to make the organization permanent. This necessitates the formation and adoption of a constitution and by-laws, and the election of permanent officers. Possibly some members may have prepared a constitution to be submitted at this first meeting. If so, and the constitution is adopted, the permanent organization may be completed at once. If this has not been done, however, a committee on constitution and by-laws and a committee on nominations should be appointed. The meeting should then adjourn to a specified date, when these committees should report. The adoption of these reports will complete the organization. All members present should sign the constitution after its adoption, and other members should sign as they join.

Officers. The officers necessary for every organization are a president, a vice-president,

a secretary and a treasurer. In small organizations the officers of secretary and treasurer may be combined in one person. The term of office and manner of election of these officers are fixed by the constitution.

The President. It is the duty of the president to preside at all meetings, and see that they are conducted in accordance with the principles of parliamentary law, and the requirements of the constitution and by-laws. He should sign all minutes of the meetings after they have been approved, and perform such other duties as the constitution and by-laws may require.

The *vice-president* discharges the duties of the president in his absence.

In discussing his opinions or rulings, the president should refer to himself as the *Chair* or as *Your President.*

The Secretary. The secretary should keep a record of all the meetings of the organization, be the custodian of all records, reports and other documents and carry on all correspondence of the organization, unless there is a corresponding secretary.

The Treasurer. It is the duty of the treasurer to receive and keep all funds, belonging to the organization, and to pay bills when they have been approved. He should, from time to time, make a report to the organization stating what money he has received and the sources from which it is derived, and also report on the expenditures, stating the purposes for which they were made.

Conducting a Meeting. At every regular meeting of the organization the order of business given in the by-laws should be followed. In most organizations this order is as follows:

1. Reading and approving minutes of the last meeting.
2. Reports of standing (or regular) committees.
3. Reports of special committees.
4. Unfinished business (not completed at last meeting).
5. New business.

Motions. Success in conducting a meeting depends upon a thorough knowledge of motions and their order of precedence by the presiding officer. All business should be brought before the meeting by a motion or a resolution. Any member desiring to introduce a matter should rise in his seat and address the president as "Mr. President" or "Madam President," as the case may be. The president should then recognize the member by speaking his name. The member then makes the necessary motion, which should be seconded by some other member and then repeated by the president. The second can be made without the member's rising from his seat or addressing the president. After the motion has been seconded and restated by the president, it becomes "the question before the house" and constitutes the business of the meeting until it is disposed of. The question is open for discussion, and may be debated at length. If there is no debate, the motion is voted on at once and disposed of.

Classification of Motions. The question before the meeting constitutes the principal motion or the *main question,* but it may be modified by other motions in the form of amendments, or set aside for other business before being finally disposed of. Motions affecting the main question are called *subsidiary motions,* and take precedence over the main question. That is, when one of these motions is made it must be disposed of before consideration of the main question can be continued. These motions are:

To amend.
To lay the question on the table.*
To take a recess.*
Questions of privilege.*
The previous question.*
To postpone to a definite time.
To postpone indefinitely.*
To commit (refer to a committee).
To adjourn.*
Those marked * are not debatable.

In disposing of these questions the presiding officer should have them voted upon in the reverse order in which they are made until the main question is again reached.

Illustration of Precedence. Suppose, for instance, that in a literary society A has made a motion that the secretary purchase a book in which to keep the records of the society, at an expense not to exceed $3.00. B moves to amend the motion by limiting the expense to $1.50. C, wishing to introduce another item of business, moves to lay the question on the table. D, anxious to get home early, moves to adjourn. There are now five motions before the house. It is obvious that if the motion to adjourn carries, all the other motions are disposed of; therefore that motion should be voted on first (a motion to adjourn takes precedence of all other motions). If the motion to adjourn is voted down, the motion to lay the question on the table is voted on next.

If that fails the amendment is voted on. If the amendment carries, the main question as amended is reached. If the amendment fails, the main question as originally offered is voted on.

The *previous question* is a motion to stop debate, and means that discussion ceases and the main question is to be voted on at once. It is seldom used except in legislative bodies. When used in small organizations it should require a two-thirds vote to carry it.

Supervision, or Rules. Most by-laws provide that any, or all, of the by-laws may be suspended for any meeting by a vote of two-thirds of the members present. This provision enables the organization to dispense with its regular routine of business for the purpose of devoting the time of the meeting to other matters of importance.

Points of Order. When a member has "obtained the floor," that is, has been given the right to speak, he should be allowed to proceed without interruption unless he violates the rules of debate or wanders from the question under discussion. Should any member feel that the speaker is out of order he may rise in his seat and say, "I rise to a point of order." He should then state his point and be seated. The speaker should also be seated until the point is decided by the president. Should the speaker feel that the decision is unjust he and one other member may appeal to the house. In stating the appeal, the presiding officer should say, "In the judgment of the house should the decision of the Chair be sustained?"

A good manual of parliamentary law is Robert's Rules of Order.

PARNAS'SUS, the ancient name of a picturesque mountain in Phocis, Greece. This mountain, to-day called Likeri, terminates in twin peaks, which reach a height of 8,000 feet, and which, except in summer, are crowned with snow. Among the ancient Greeks it was held sacred to Apollo and the Muses, Dionysus and Pan. There were two especially-consecrated spots on the mountain; one was the Castalian fountain, a sparkling spring, still flowing, which was anciently supposed to give poetic inspiration to those who drank from it; the other was Delphi, the seat of the famous oracle.

PARNELL, CHARLES STEWART (1846–1891), an Irish statesman and one of Ireland's foremost champions of Home Rule. He was born at Avondale, Ireland, and was educated at Cambridge. Becoming a member of Parliament for Meath in 1875, he organized the active Home Rule party and developed its obstruction tactics. In 1879 he formally adopted the policy of the newly-formed Land League, of which he was chosen president, and after 1880 was the virtual head of the Irish party in Parliament. In the session of 1881 so vigorous was his agitation against the Crimes Act and the Land Act that, under the terms of the former, he was imprisoned for six months.

At the general election of 1885 Parnell was reëlected for Cork, and in the next year he and his followers supported the Home Rule proposals introduced by Mr. Gladstone, while he also brought in a bill for the relief of Irish tenants. In 1887 he and other members of his party were accused by the *London Times* of complicity with the crimes and outrages committed by the extreme section of the Irish Nationalist party. To investigate this charge, a commission was appointed by the government, which acquitted Parnell of all the graver charges. Shortly after this, he became involved in a scandal with Mrs. O'Shea, wife of one of his supporters, and lost the influence and the leadership of his party. He died three months after his marriage to Mrs. O'Shea. He was the author of a number of books, including *An Historical Apology for the Irish Catholics, Treatise on the Corn Trade and Agriculture* and *On Financial Reform.*

PAROCHIAL SCHOOLS, *pa ro'ki al,* elementary schools which are supported and controlled by religious denominations. Each school is intended to provide instruction for the children of the district or church parish within which it is located, such instruction including both secular and religious teaching. Although the Lutherans maintain a parochial school system, the Roman Catholic organization is by far the more highly developed. The bishop is the head of all the schools in his diocese and he is assisted in their management by a board of priests or diocesan superintendents, whose duties are much like those of public-school superintendents. Within recent years the system has been developed to give high-school instruction.

PAR'ODY, a humorous imitation of any serious writing, either prose or poetry. Parody in verse differs from burlesque and from travesty in that it deals with an entirely different subject from the poem imitated and

resembles it only in form and expression. Lewis Carroll included several clever parodies in his two *Alice* books, and imitations of this nature are a favorite form of humorous writing by many minor poets. The following stanza is typical of this form of poetry:

Mary had a little wheel;
Its tires were filled with air;
It went wherever Mary went,
And she went everywhere.

PAROLE, *pa rohl',* derived from the Latin word meaning *speech,* a term signifying a verbal agreement, as distinguished from written contracts. A prisoner released on parole is one who is given his conditional freedom on his making certain promises as to future conduct.

In military usage a parole is a pledge which a prisoner of war makes to his captors not to take up arms against them if released. If the prisoner is recaptured and found to have violated his pledge he is put to death. The word also means a watchword or countersign. In law a parole is a pledge given for the release of a prisoner.

PARRAKEET, *pair'a keet,* a bird of brilliant plumage belonging to the parrot family and distinguished from the parrot by its small size and long tail feathers. One species, the *ring parrakeet,* is common in the East Indies, especially in Ceylon. It is a beautiful bird, about the size of a pigeon, and is green, with a red collar mark. It is very docile and quite a good talker. An allied species, the *rose parrakeet,* is distinguished by the rose-red black-edged collar of the male. In Australia and Tasmania is found a species that is dark green above and yellow below, which lives and nests on the ground, making only occasional short flights. Another Australian species, the *zebra parrakeet,* is a favorite cage bird. It is yellow above, green below, marked on the cheeks with blue and black spots, and on the back with cross bars of black. The brown wings are touched with green. One group of African parrakeets, because of their demonstrations of affection, are called love birds. The *Carolina parrakeet,* a species once common in the United States, has been almost exterminated. It is now occasionally seen in wild parts of Florida and the lower Mississippi Valley.

PARRISH, Maxfield (1870–), one of the foremost of American artists, noted as a painter, decorator and illustrator. He was born at Philadelphia, was graduated from Haverford College, and studied art at the Philadelphia Academy of Fine Arts and at Drexel Institute. In 1897 one of his designs won a prize offered by the *Century Magazine* for a cover, and since then his decorative posters and colored magazine covers have been in demand. His work is characterized by delicate humor, originality and exquisite color. He is most successful when handling a subject that allows free play of imagination. His illustrations for children's books are incomparable in inventiveness and rich, glowing color. His most beautiful illustrations have been made for Field's *Poems of Childhood,* Mrs. Wharton's *Italian Gardens,* Irving's *Knickerbocker History of New York* and *Mother Goose in Prose.* As a mural decorator he has achieved notable success. The "Old King Cole" design, on a wall of the Knickerbocker Hotel, New York, and decorations in hotels in Chicago and San Francisco are representative.

PAR'ROT, a name given to about 600 species of tropical climbing birds found chiefly in Australia, the Malay Peninsula and Central and South America. All have short, stout, hooked bills, strong legs and peculiarly shaped feet—double webbed front and double rear toes—especially adapted to the birds' manner of life. In climbing, the birds frequently use their bills and balance themselves with their long, broad tails. Nearly all parrots have brilliant plumage—not always with colors artistically combined—and loud, harsh voices. They live in large communities and feed upon plantains, apples, papaws, grains, buds and nuts, occasionally insects, and, unlike other birds, manipulate their food with their feet. The average age of parrots is sixty years, though some birds in captivity have been known to live ninety years. This is one of the few animals below man to whom the gift of speech is vouchsafed, but as the bird has not the sense to use it intelligently, it is a questionable blessing.

PARROT

PARRY SOUND, Ont., the county town of Parry Sound County and the seat of the Parry Sound judicial district. The Grand Trunk, Canadian Pacific and Canadian Northern Ontario railways, beside the steam-

ers of the Northern Steamship Company, furnish excellent transportation facilities. There are saw mills, veneer, boat, sash and door factories and machine shops, and manufactures of charcoal, spools and buttons. It is a distributing point for camping and tourist parties. Population, 1917, about 5,000.

PARSEES, or **PARSIS,** *phar'seez,* the name given in India to the present-day followers of Zoroaster, settled chiefly in Bombay and Surat and the vicinity. The name is derived from the Persian province of Pars, where they originated, and from which they were driven in the seventh century by Mohammedans. The Parsees venerate fire as the symbol of their god Ahurâ-Mazda (Ormuzd), to whom they have dedicated fire temples, on the altars of which the sacred flame is kept continually burning. The Parsees are successful merchants, who, through their honesty and integrity, have won the respect of Europeans. Their religious beliefs have been modified by Hindu influences, though they still observe rigidly some of their old practices. They never intermarry with those of another sect and never eat food prepared by one of a different creed. One of their most curious customs is their method of burying their dead (see TOWERS OF SILENCE). The number of Parsees in India at the present time is about 90,000.

PAR'SIFAL, a solemn music drama by Richard Wagner, founded on a thirteenth-century epic poem by Wolfram von Eschenbach. Wagner wrote the words of his drama in 1877 and composed the music five years later. The story, briefly, is as follows: The Cup (Holy Grail) from which Christ drank at the last supper, and the Lance with which his side was pierced as he hung on the cross, were brought by celestial messengers to Titurel, chief of the Knights Templars, for safe keeping. This knight built a castle on Monsalvat, a remote peak of the Pyrenees, to shelter the sacred relics, and gathered together a band of knights to guard them.

An evil character named Klingsor, who had been refused membership in the brotherhood, became its bitter enemy, and near the castle he created a magic garden and in it put enchantresses to ruin the knights. When through his devices the castle was reduced to a state of utmost degradation and humiliation, Parsifal, a guileless youth, came to Monsalvat and learned the story of the Grail and of the curse. By virtue of his moral strength he resisted the seductions of the garden and restored the castle and the knights to their original state of purity.

PAR'SLEY, a plant first known in Sardinia, but grown extensively throughout the world for two centuries. One species, the common parsley, is a well-known garden vegetable, the leaves of which are used for seasoning and for the purpose of decorating table dishes.

PAR'SNIP, a plant native to Europe and Asia, now extensively cultivated in all countries for it edible root. This root is long, white and tapering, about the size and shape of a carrot root. It has not the commercial or the food value of carrots, but is an important garden vegetable. In the latitude of New York the seeds are sown in April, covered with half an inch of soil, and the plants are thinned out, a six-inch space being left between the plants. The tubers are improved by frost, and may be left in the ground until December. The tops are sometimes used as fodder for cattle.

PAR'SONS, KAN., in Labette County, 137 miles southwest of Kansas City, on the Neosho River and on the Missouri, Kansas & Texas, the Memphis, Kansas & Colorado and the Saint Louis & San Francisco railroads. A large state hospital for epileptics is located here, and other prominent buildings are a Y. M. C. A. building, the railroad depot, a Masonic Temple and a Carnegie Library. Glenwood and Forrest are fine parks. There are extensive natural gas wells in the vicinity, and sandstone and limestone quarries are in operation. The city has shops and general offices of the Missouri, Kansas & Texas railroad, flour and grist mills, elevators, a handle factory, a foundry, a creamery and shirt and skirt factories. The place was laid out and incorporated in 1871. The commission form of government was adopted in 1911. Population, 1910, 12,463; in 1917, 15,952 (Federal estimate).

PAR'THENON, a celebrated Greek temple, built in the time of Pericles, in the golden age of Greece. It was erected on the Acropolis at Athens and was dedicated to Athena, the patron deity of the Athenians. It is the finest example of ancient architecture; and, although it has not escaped the scars left by wars and time, the noble lines and exquisite proportions even of its ruins bear witness to what was once the most nearly perfect building ever constructed.

The temple is built in the Doric style, of white marble, and the ground dimensions are 228 by 101 feet. Originally it had eight thirty-four-foot columns at each end and seventeen columns on each side. The top of the pediment was sixty-four feet high. Above the columns a frieze extending around the entire exterior of the building bore colored relief sculpture representing the chief events in the great religious festivals of the Greeks, in the legendary life of Athena and in the history of Greece. The interior was divided into two rooms, one of which contained Phidias' celebrated gold and ivory statue of Athena.

In the Middle Ages the Parthenon served intermittently as a Christian church and as a mosque. In 1687 it was rendered unfit for religious uses by an explosion of gun powder which the Turks had placed in it when Athens was besieged by the Venetians. The more valuable pieces of sculpture the building contained have become part of various European collections. See ELGIN MARBLES.

PARTICIPLE, *pahr'ti sip'l,* in English grammar a form of the verb which partakes also of the nature of an adjective or a noun. As a verb it may take an object or a complement, or be modified by an adverb. At the same time it may be used as an adjective to modify another word, or as a noun serve as the subject, complement or object of a verb. There are three tenses of the participle: present, past, perfect. These forms occur in both active and passive voices of transitive verbs, as illustrated by the following forms of the verb *receive:* Present active, *receiving;* present passive *being received.* Past active, *received;* past passive, *received.* Perfect active, *having received;* perfect passive, *having been received.* The three participial forms of the verb *to be,* an intransitive verb, are *being, been, having been.*

Uses of the Participle. The following sentence contains a present participle used as an adjective: "Pirates *sailing* the Spanish Main are characters in this thrilling story." *Sailing* is derived from the verb *sail.* It is used as an adjective to modify *pirates,* but shows its verbal nature in taking a direct object, *Main.* Note that *thrilling* also ends in *ing.* It is not, however, a participle, as it is not a verb-form nor has it any other use than that of a pure adjective.

Uses of the noun participle as the (a) subject, the (b) object and the (c) complement of a verb, and as the (d) object of a preposition are illustrated in the following type sentences:

(a) *Fighting* evil is helping good.

(b) He chose *voting* as the best measure of reform.

(c) *Helping* in (a) is used as a complement.

(d) In *exercising* the muscles we become stronger.

Some grammarians prefer to call the noun verbal ending in *ing* a *gerund,* limiting the term *participle* to verbals used only as adjectives. The term *infinitive in ing* is also used by some.

The participle is used in independent constructions, as in the following: "That being my story, I ask you to overlook the offense." "The decision having been made, there was nothing else to do."

PART'NERSHIP, the association of two or more persons, for the purpose of undertaking and prosecuting conjointly any business, occupation or calling for gain. Partnerships may be formed in three ways—(1) by written contract, (2) by oral agreement, (3) by implication, that is, by acts leading others reasonably to believe that a partnership exists. The duration of the partnership may be limited by the contract or agreement, or it may be left indefinite, subject to be dissolved by mutual consent, or by withdrawal of one member. It may also be dissolved by a court for various reasons.

Partners are *real* when they are directly engaged in the conduct of the business. A *silent,* or *dormant,* partner is one who invests capital in the firm, but does not take any active part in its management. The powers of partners are very extensive, and the contract or other act of any member of the partnership in matters relating to the joint concern, is, in point of law, the contract or act of the whole and consequently binding upon the whole, to the extent of rendering each liable for it individually, as well as through his interest in the partnership property. This rule holds, even though the acts of one partner are fraudulent in relation to the others.

In a few states the partnership is recognized in law as an artificial person which can sue and be sued and declared bankrupt, but in nearly all jurisdictions suits at law

cannot be begun for or against the firm but must be in the name of the partners.

A partnership may be limited to a particular transaction or branch of business, without comprehending all the adventures in which any one partner may embark, but such reservation must be specified in the contract. For in the usual course each member of a partnership is liable at common law for the debts of the firm, and a silent partner is responsible for all debts of the firm which have been contracted during his partnership.

Limited Partnership. A limited partnership is one in which one partner is responsible for all the debts of the firm, and the liability of the other partners is limited to their contribution to the capital of the firm. Limited partnerships are regulated by the laws of the state in which they exist, and most states require the word limited to be placed after the firm name, as Henry Damon & Co. (limited).

PART'RIDGE, a name somewhat loosely applied in America to a number of birds of the grouse family. In New England the ruffed grouse is called a partridge; in the Southern states the quail is called a partridge, and in Canada the Canada grouse is called the wood, cedar or spruce partridge (see GROUSE). True partridges are found in the eastern hemisphere, and there are about 150 species. The common partridge is a handsome gray bird, with a dark chestnut horseshoe mark on the breast and broad reddish bars on the sides and flank. It feeds on grain and other seeds, insects and such pupae as are chiefly found in cultivated grounds. Like the quail, and unlike the true grouse, the partridges live in pairs. Their nest, which is circular and lined with grass, is placed among reeds, in hedges or in stubble, often near a road and contains from nine to twenty eggs.

PARTRIDGE

PARTRIDGE, WILLIAM ORDWAY (1861–), an American sculptor, also distinguished as an art critic and lecturer. He was born in Paris, was educated at Columbia University, New York City, and later studied sculpture in Florence and Rome. He has executed a number of portrait busts, including those of Shakespeare, Milton, Byron, Tennyson, Burns, Poe and Markham. He has also made a fine bronze statue of Hamilton and an equestrian statue of General Grant, both of which are in Brooklyn. In 1894 he completed a fine statue of Shakespeare for Lincoln Park, Chicago. Partridge has written *Art for America*, *The Technique of Sculpture* and *Song Life of a Sculptor*.

PAS, MAN., formerly called LE PAS (*le pah'*), or THE PAS, a town on the Saskatchewan River at the southern end of the new Hudson Bay Railway. It is served also by the Canadian Northern Railway. Pas is situated in the central-western part of the province, 258 miles east of Prince Albert. It is in a great timber region, and the chief industry is the manufacture of lumber. Fish and game abound in the neighboring lakes and woods. Population, about 2,500.

PASADE'NA, CALIF., a beautiful residential city and winter resort, situated in Los Angeles County, nine miles northeast of Los Angeles and twenty miles from the sea. The city has a beautiful location at the head of the San Gabriel Valley, near the base of the Sierra Madre Mountains. Nearby are Mount Lowe, a mile high and a favorite resort for tourists, and Mount Wilson, the site of the solar observatory of the Carnegie Institute at Washington. The surrounding country is largely devoted to the cultivation of oranges, lemons and other fruit.

The city is served by the Southern Pacific, the Santa Fe, the Salt Lake and the Pacific Electric railways. The streets are broad, well paved and well kept. Pasadena is a city of beautiful homes surrounded by lawns decorated with shade trees and flowers. Its magnificent hotels, the Huntington, the Maryland, the Green and the Raymond, serve great numbers of visitors.

The most prominent buildings are the Federal building, the Public Library, the high school and hospitals and churches. Aside from the public schools the leading educational institutions are Throop College of Technology and the Nazarine University.

The city was settled in 1870 by people from Indianapolis, Ind., who planted the first orchards here. It was incorporated in 1886, and adopted the commission form of government in 1913. Population, 1910, 30,291; in 1917, 49,620 (Federal estimate).

PASCAL, *pa skahl'*, BLAISE (1623–1662), a French philosopher and mathematician, born at Clermont, in Auvergne, and educated at Paris and Rouen. Equipped with the best scientific training possible in his day, and intensely interested in the development of science—to which he made valuable contribution—he held firmly to the belief that absolute truth is obtainable only through divine revelation. As a boy he was very precocious, writing a treatise on conic sections at the age of sixteen. In 1654 he joined the Jansenists and entered their convent at Port-Royal. From then onward scientific and religious interests equally occupied him. His writings include *Provincial Letters*, *Thoughts* and *Apology for the Christian Religion*. He is sometimes inaccurate, but a master of irony, and gifted with a graceful, witty and brilliant style.

Pascal's Law, in physics, a theorem discovered by Pascal. It has been stated as follows:

> Pressure exerted anywhere upon the surface of a liquid enclosed in a vessel is transmitted undiminished in all directions, and acts with equal force upon all equal surfaces, and at right angles to the surfaces.

PASHA, *pa shah'*, an honorary title bestowed by the khedive of Egypt or the sultan of Turkey on high government officials, citizens in private life and even distinguished foreigners whom these rulers wish to honor. In the army it has three grades, depending on the rank of the officer bearing it—general-in-chief, general and brigadier. Admirals, civil officers of the rank of vizier and provincial governors are among others receiving it. The title always follows the name of the person; for example, Emin Pasha.

PASSA'IC, N. J., in Passaic County, twelve miles from New York City, on the Passaic River, at the head of navigation, and on the Lackawanna, the Erie and the New York, Susquehanna & Western railroads. It has a picturesque and healthful location, in the most fertile region of the state. Its city hall and other public buildings are fine structures, and it has several parks. The Reid Memorial Library is one of the finest structures in the city. There are rubber and woolen mills, dye and print works, brickyards, chemical works, silk mills and other factories. In the vicinity are large vineyards, and considerable wine is manufactured. The municipal water supply comes from above the falls, about four miles away. The place was settled about 1679, was incorporated as a village in 1869 and was chartered as a city in 1873. The commission form of government was adopted in 1911. Population, 1910, 54,773; in 1917, 74,478 (Federal estimate).

PASSENGER PIGEON. See PIGEON, subhead *Passenger Pigeon.*

PASSION, *pash'un*, FLOWER, a large genus of plants, native mostly of the warm regions of America. They are all twining plants, often spreading over trees to a considerable length, and in many cases they are most beautiful objects, on account of their large, rich or gaily-colored flowers, which are succeeded by orange-colored edible fruits called *maypop*. They received their name from the early Spanish missionaries, who believed that they saw in the beautiful flowers emblems of the crucifixion of Christ. On account of their beauty, many of the species are cultivated in hothouses or even out of doors in mild climates. About ten species are natives of the United States.

PASSION PLAY, a dramatic performance enacted every ten years at Oberammergau, a little village in Bavaria. The play represents the passion and death of Christ, and is enacted by the villagers of the town. In 1633 the inhabitants of Oberammergau, as an act of gratitude because they had escaped a plague which was causing much desolation, vowed that they would perform every tenth year a play representing the passion of Christ. Ever since, the play has been performed regularly and has attracted visitors from all parts of the world. There are about six hundred performers, all villagers, who play their parts with religious fervor and reverence. The actors for the leading parts are chosen especially with regard to their own likeness to the characters they are to represent. Anton Lang, a man esteemed for his character, took the part of Christ in 1900 and in 1910.

PASS'OVER, a Jewish festival commemorating the providential escape of the Hebrews in Egypt, when God, smiting the firstborn of the Egyptians, *passed over* the houses of the Israelites which were marked with the blood of the paschal lamb. It is celebrated on the first full moon of the spring, from the 14th to the 21st of Nisan, the first month of the sacred year. During the eight days of

the feast the Israelites were permitted to eat only unleavened bread; hence the Passover was also called the "feast of unleavened bread." At the service for the eve of the Passover, the history of the deliverance of the Jews is read by the head of the house, special dishes are prepared symbolizing the affliction and burdens of their forefathers in Egypt, and psalms and songs of thanksgiving are sung in praise of their miraculous deliverance.

PASS'PORT, a certificate of citizenship granted by a government to the citizens who wish to travel in foreign countries. It certifies to the citizenship of the bearer, and requests for him a safe passage through the country, the protection of the laws, and such lawful aid as he may require. In the United States the Secretary of State is the only official authorized to issue passports. The application must be in the form of an affidavit declaring the citizenship of the applicant, and must be accompanied by a certificate from at least one witness that the statements made are true. It must be sworn to before some one authorized to administer oaths, and the applicant must take the oath of allegiance to the United States. A fee of one dollar must accompany the application. A passport is good for two years from the date of issue.

Except in times of war, passports are granted as the right of any citizen applying for one, but they are unnecessary except in Russia, Turkey and the countries of the Far East. However, owing to the disturbed conditions in Europe during the World War and the period immediately following, the issuing of passports was greatly restricted in the United States. In Canada passports are issued by an under secretary of the London Foreign Office at Ottawa.

PASTEUR, *pas tur'*, Louis (1822–1895), a French chemist and biologist, born at Dôle, France, and educated at the University of Jena and at the Ecole Normale, Paris. In 1867 he became professor of chemistry at the Sorbonne, and in 1882 was chosen a member of the French Academy. Four years later, when the Pasteur Institute was established, he became director of that institution, an office he held the rest of his life. Pasteur was one of the leading scientists of the nineteenth century and the value of his work cannot be estimated. He has saved the lives of many children by his invention of the process known as pasteurizing, to prevent fermentation of milk. He originated a method of checking hydrophobia by inoculation, and a treatment for animal cholera and anthrax. He saved France millions of dollars through his discoveries in connection with silkworm diseases; and he accomplished as practical results in his researches regarding the diseased conditions affecting the drinkers of wine and beer. It is no exaggeration to say that the results of Pasteur's researches have been of great importance to every known branch of physical science.

LOUIS PASTEUR

PAS'TORAL PO'ETRY, any poetry which treats of a subject in a rural setting. The loves of shepherds and shepherdesses and the antics of nymphs and satyrs frequently are its theme. The first European pastorals seem to have been the *Idyls of Theocritus*, written in the third century B. C. These are exquisite little pictures of rustic life, sometimes with a comic note, sometimes containing a dramatic episode. Later Vergil produced a similar genre in his *Eclogues*. Throughout Italy, France and Germany at a later period pastoral poetry flourished. The earliest English pastoral of note is Spenser's *Shepherd Calendar*, written in 1579. In its wake followed a long procession of pastorals of varying form and merit. They include Marlowe's *Passionate Shepherd*, Sidney's *Arcadia* and Ben Jonson's *The Sad Shepherd*. There is a distinct line separating the pastoral and the later nature verse of such poets as Cowper, Burns, Shelley and Tennyson.

PATAGO'NIA, the name formerly applied to the extreme southern part of South America, lying between latitude 38° S. and the Strait of Magellan. The region was discovered by Magellan in 1520. In 1881 it was divided between Argentina and Chile, the portion east of the Andes going to Argentina, and that west of the mountains to Chile. The name now has no geographical significance. Punta Arenas, at the southern end of the Chilean portion, is the farthest south of any city in the world.

PAT'ENT, in the ordinary meaning of the term, a grant by the government to an inventor or discoverer of a useful device or art, of the exclusive right to make, manufacture and sell his invention or discovery for a definite period. Patents were granted by the colonial and state governments, before the adoption of the Constitution, and that instrument (Art. I, Clause 8) confers upon Congress the power to grant patents and copyrights. All patents are granted through the Patent Office, which is attached to the Department of the Interior, and in charge of the Commissioner of Patents.

How to Obtain a Patent. Applications for patents must be made to the Commissioner of Patents on special forms provided for the purpose. The application must contain a clear and concise description of the article, with the necessary drawings or models and must be accompanied with an application fee of $15. The applicant must also file under oath a statement to the effect that he believes himself to be the inventor of the article. While any inventor may prepare and file his application, inventors not thoroughly conversant with the patent laws are advised to employ a registered patent attorney, since the value of the patent depends largely upon the accuracy and completeness of the specifications in the application.

When the application is received it is referred to a special examiner, whose duty it is to determine whether or not the article is novel and useful and whether it has been anticipated in the United States or foreign countries. If no objection is found, the patent is issued on payment of an additional fee of $20. If objections arise, the applicant is given opportunity to amend his application so as to remove them, if such removal is possible.

Duration of a Patent. A patent is issued for seventeen years and may be renewed for another seventeen years on payment of a fee of $30.

Number of Patents. The United States issues more patents than any other country in the world. Since 1907 the number of applications has varied from 60,000 to over 71,000 a year, and the number of patents granted averages a little more than one-half the number of applications.

PATENT LEATHER, formerly known as *japanned leather*, is leather prepared by a process which gives it a hard, shiny surface like lacquer or enamel. Successive coats of lampblack mixed with linseed oil are put on the flesh side of the hide, each when dry being rubbed with pumice stone. The skins are then treated with a liquid black dye containing turpentine and allowed to stand for about a month. They are then baked in a moderately heated oven for three days. After this they are exposed to sunlight for about ten hours, and the process is then complete.

PAT'ERSON, N. J., the county seat of Passaic County, and the third city of the state in population, following Newark and Jersey City. It is twelve miles north of Newark, on the Erie, the New York, Susquehanna & Western and the Delaware, Lackawanna & Western railroads. It is also connected with adjoining towns by electric lines and with the Delaware River by the Morris Canal. The city is built upon a broad plain and the surrounding hills, on a curve in the river. The river at this point has a perpendicular fall of 50 feet, and within a short distance below the falls, a descent of 20 feet, affording exceptional water power. The gorge in the river is spanned by a number of bridges. There is a park along each side of the falls, and on a hill near by is a fine s. iers' monument. The important buildings include the city hall, the courthouse, the postoffice and a number of business blocks. Among the charitable institutions are the Paterson General Hospital, Saint Joseph's Hospital, Old Ladies' Home, an Elks' Home, a Federal building, a city hall and a Children's Nursery. The city is the leading silk-manufacturing city of the United States; there are 350 silk factories here. Other important industries include the manufacture of locomotives, and bridge work, iron and steel products, brass, machinery, cotton goods, thread, paper and jute.

The city was founded in 1791 by an organization of which Alexander Hamilton was one of the leaders. It was incorporated as a city in 1851. Its growth has been steady and permantent. Population, 1910, 125,600; in 1917, 140,512 (Federal estimate).

PATIENCE, *pa'shens*. See SOLITAIRE.

PAT'MOS, an island off the coast of Asia Minor, twenty miles south of Samos. Its length is about ten miles, its breadth, nearly six miles. The island is an irregular mass of barren rock; agricultural products are scanty, and the inhabitants are occupied

chiefly with fishing. It is famous as the supposed place to which Saint John was exiled and where he wrote the Fourth Gospel. The island belongs to Italy. Population, about 4,000.

PAT'NA, British India, in the district of Bengal, on the Ganges, 285 miles northwest of Calcutta. It extends for nine miles along the river, and its tombs, mosques and monuments present a fine appearance when seen from the river. Its streets, however, are narrow and dirty, and its buildings are of little interest. At the western side of the city is the suburb of Bankipur, where the government offices and European residences are situated. By reason of its central position and natural advantages, the city is an important business center. There is a government college and a school of engineering. Population in 1916, 140,112.

PATRIARCH, *pa'tre ark,* in Hebrew history, the father and head of a family or tribe, specifically Abraham, Isaac, Jacob and the rulers of the Twelve Tribes. The patriarchal office was hereditary. In the time of Christ the term was applied to the president of the Sanhedrin, the highest governmental body in Syria and Judea. In the early Christian Church the bishops of Rome, Constantinople, Antioch and Jerusalem were called patriarchs. The patriarch of Rome in time became the supreme pontiff of the Roman Catholic Church, with the title of Pope.

PATRICIAN, *pa trish'an,* a word derived from the Latin *pater* (father), applied in ancient Rome to citizens whose forefathers were Romans, therefore persons of pure, unmixed blood and consequent social and political standing. This class was distinct from the plebeians, members of conquered tribes who had been brought to Rome, and their descendants.

PAT'RICK, Saint (396–469), the patron saint of Ireland. It is believed that he was born near the site of what is now Dumbarton, Scotland. At the age of sixteen he was taken captive to Ireland, but after six years he escaped. Feeling himself called to abolish paganism from the land of his captivity, he studied for the ministry, was consecrated bishop of Ireland, and began his missionary work there in 432. It is said that he founded 300 churches in the island and baptized more than 12,000 converts. Patrick left an autobiography which he called a *Confession,* but it was more psychologic than historic, and the known facts of his life are few. Legend says he drove the snakes out of Ireland, and that he worked miracles. "Saint Patrick's Day," the seventeenth of March, is celebrated by the Irish people throughout the world.

PA'TRONS OF HUSBANDRY. See Political Parties in the United States.

PATROON' SYSTEM, the plan adopted by the Dutch West India Company for the colonization of New Netherlands, now New York state, by which any member of the company could gain possession of a tract of land sixteen miles long on any one side of a river or bay, establishing there within four years a colony consisting of fifty persons over fifteen years of age. The evil of this system was soon apparent, for the proprietor, or *patroon,* developed the power of a feudal lord, which resulted in a typical landed aristocracy. The system was gradually changed to remove its most objectionable features, although many of the estates thus created endured well into the nineteenth century. See Van Rensselaer, Stephen.

PATTI, *pat'ee,* Adelina Maria Clorinda (1843–1919), one of the world's greatest sopranos. She was born in Madrid, Spain, of an Italian father and Spanish mother, and emigrated to America when very young. Her first instruction in music was received from her brother-in-law, Maurice Strakosch, and her first stage appearance was made in New York in the opera *Lucia,* when she was sixteen years old. Two years later she made her London début, and at once her rare gifts were recognized. She sang in all the great European centers and attained almost incredible popularity. In 1868 she married Marquis de Caux, whom she divorced in 1883. Subsequently she married the tenor Nicolini, and a year after his death, in 1899, married Baron Cederström. In her last years she lived on her estate of Craig-y-Nos, in Wales. After 1911 Madame Patti did not make public concert tours.

ADELINA PATTI

PAUL, the name of five Popes of the Roman Catholic Church.

Paul I, Pope from 757 to 767, brother of Stephen II, was on good terms with Pippin and Charlemagne.

Paul II, Pope from 1464 to 1471, caused a crusade to be preached against the Hussites.

Paul III, Pope from 1534 to 1549, formerly Alessandro Farnese, was a zealous defender of the Church and did much to suppress heresy. Among the important events of his reign were the publication of a brief condemning slavery, the excommunication of Henry VIII of England, the approval of the Order of Jesuits and the convocation of the Council of Trent. He was a great patron of art and appointed Michelangelo architect in chief of the Vatican and Saint Peter's.

Paul IV, Pope from 1555 to 1559, joined France in the war for the conquest of Naples (1555–1557).

Paul V, Pope from 1605 to 1621, laid an interdict on Venice and established the Congregation of the Oratory and of the Ursuline and Visitation.

PAUL, SAINT (3–67), the first Christian missionary, called "the Apostle of the Gentiles." He was born in Tarsus, the chief city of Cilicia, of a prominent Hebrew family, and was called SAUL until the time of his conversion. He was educated at Jerusalem under Gamaliel, one of the most learned rabbis of the day. At an early age he became a member of the city governing body, and probably had something to do with the stoning of Stephen.

Soon after this event he was commissioned by the high priest to persecute Christians. On the road to Damascus, whither he was bound to carry on this work, he experienced conversion (about A. D. 35). This event (see *Acts* IX) occurred when he was about thirty-two years old. Immediately he began to preach the Christian faith, and thus he incurred the wrath of the Jews. Compelled to flee Damascus, he retired into Arabia, where he remained about three years in obscurity. After this he returned to Damascus and Jerusalem and later went to Antioch and preached there.

In A. D. 46 Paul set out with Barnabas on the first of this three missionary journeys, going from Antioch in Syria to Cyprus, thence to the cities of Pisidia in Asia Minor and returning to Antioch. On his second journey, made five years later, he traveled as far west as Macedonia, visiting Philippi, Thessalonica, Athens and other Greek cities, founding the first Christian churches in Europe. Paul's last missionary journey, begun in A. D. 54, took him to Ephesus. After this he went to Jerusalem. There he was saved from an angry mob by the commander of the Roman garrison, who imprisoned him. At the end of two years, to escape trial at Jerusalem, he availed himself of his right as a Roman citizen and appealed to Caesar. Accordingly he was sent to Rome, where he spent two years more in imprisonment. There are later accounts of his work in Asia Minor and Greece. According to tradition he suffered martyrdom.

Paul's writings constitute a large part of the New Testament and include *First* and *Second Thessalonians, Galatians, First* and *Second Corinthians, Romans, Colossians, Philemon, Ephesians, Philippians, Titus* and *First* and *Second Timothy.*

PAUL'ISTS, an Order of Roman Catholic priests, more correctly called The Congregation of Missionary Priests of Saint Paul the Apostle. The Order was organized in 1858 at New York City by Rev. Isaac Thomas Hecker, for the purpose of spreading the Catholic faith among non-Catholics in the United States. New York is the center of Paulist activity, and the churches there belonging to the Order and also those in Chicago are famous for their boy choirs, the latter being second only to the Vatican choir.

PAUNCEFOTE, *pawns'fut,* JULIAN, Lord (1828–1902), an English statesman and diplomat, born at Munich, Germany, educated at Paris and Geneva. He was admitted to the bar in 1852. In 1866 he was appointed attorney-general at Hong Kong and acted as judge of the supreme court in 1869 and again in 1872. He was knighted in 1874, and two years later he became undersecretary of foreign affairs. In 1888 he was appointed as British minister at Washington, and in 1893 he was raised to the rank of ambassador. His greatest diplomatic success was the completion with Secretary Hay, of the treaty relating to the construction of a trans-isthmian canal. He always used his influence to promote a friendly feeling between the United States and Great Britain. See HAY, JOHN; HAY-PAUNCEFOTE TREATY.

PAUPERISM. A pauper, before the law, is a person who is in such a state of poverty that he must depend upon public or private charity for support. The chief causes of poverty are intemperance, ill health, wastefulness and lack of employment. The problem of pauperism has perplexed society for centuries, but it is only in recent times that

systematic effort has been made to remedy the causes leading to it. During the Middle Ages pauperism was attended to chiefly by the Church, which taught that alms-giving and charity were essential means of grace, and churches of all denominations still give some attention to those in need of support. But the problem of pauperism became so general that it became necessary for the state to take charge of it. Each country has its own methods. In the United States the government units that look after paupers are the city and the county, except in a few of the New England states, where the township is the unit of local government. The great objection to this system of relief is that it does not try to remove the causes of poverty; one who becomes a pauper is likely to remain in that condition.

Bureaus of Charity. To remedy this defect in public charity, organizations have been formed in many large cities for the purpose of relieving immediate want and at the same time assisting the family or individual to become self-supporting. The chief purpose of these organizations is to do away with the causes of poverty. Every application for assistance is thoroughly investigated, and such aid as seems most likely to help the applicant to help himself is given. Moreover, the organization continues its friendly relations with those in need of assistance until they have become self-supporting. See CHARITY.

PAVEMENT, a floor or covering of stone, wood, brick or asphalt, laid on the ground so as to make a hard, smooth surface, fit for a roadway. Pavements were in use in ancient times, though their origin is obscure. The streets of Babylon are said to have been paved in 2000 B. C. According to Livy, Rome was paved as early as 170 B. C. and pavements of lava have been found in the excavations of the old Roman cities of Pompeii and Herculaneum. In the Middle Ages pavements were not common until the twelfth century, and from that time to the nineteenth century they were rudely constructed, large cobblestones being generally used. Of modern cities, Paris is said to have been the first paved; now at least a part of the streets in all cities of Europe and America have pavements.

Stone pavement is the most durable, and this is used for the business streets of large cities. Granite, which is the most suitable stone, is made into rectangular blocks, which are laid on the narrow side, on a foundation of concrete, and are set close together in rows, across the street. Such pavements are very expensive and are used only in the streets where a great amount of heavy traffic is done.

Brick pavement is of bricks made especially for the purpose, being so hard-burned that they have a glassy appearance. They are laid on a foundation of sand, gravel or tarred planks, in a manner similar to that of the granite blocks in a stone pavement. This pavement is used extensively in the Western United States.

Wooden Pavement. A wooden pavement made of round blocks about six inches long and so laid that the ends formed the surface was formerly quite popular, but it was soon found that the blocks wore unevenly and the pavement was not durable. A wood pavement of brick-shaped blocks filled with tar is now in use in many cities, cedar or yellow pine being the wood generally used. This pavement is smooth and noiseless, and its use is rapidly increasing.

Asphalt Pavement. The foundation for asphalt pavement is usually of concrete. On this is laid a *binder*, which consists of small broken stones mixed with asphaltic cement. Upon this the wearing surface, which is a mixture of sand, Portland cement and asphalt mixed together at a high temperature, is spread. This makes a strong, noiseless and durable pavement, especially suited to automobiles, but not to heavy traffic.

Comparative Cost. Local conditions enter very largely into the cost of paving streets, but the following estimates may be considered fair under normal conditions:

Sand-clay, per mile of 15-foot road	$600 to 800
Burnt-clay, per mile of 15-foot road	1,500
Macadam, per mile of 15-foot road	5,000
Concrete, per mile of 15-foot road	10,000
Asphalt, per mile of 15-foot road	15,000
Wood-blocks*, per mile of 15-foot road	20,000
Brick, per mile of 15-foot road	15,000 to 20,000

*On concrete base, which represents about one-half the total cost.

PAWN'BROKER, a person engaged in the business of lending small sums of money, usually at usurious rates of interest, who receives as security for the loan jewelry, clothing or other salable articles. If the person borrowing the money fails to repay the loan, together with the interest due at the time specified, the pawnbroker has the right to sell the article pawned. Much fraud has

been practiced in this business. Dishonest pawnbrokers have been known to accept installment payments without crediting the amounts on their books, and again to sell articles left with them before the money borrowed was due. To-day legislation regulating pawnbroking has been enacted in every state and in Canada. In several large cities there are large respectable pawnbroking establishments doing a legitimate business. Some states have authorized state pawn shops, where the needy are accommodated at fair rates of interest.

PAWNEE', a tribe of North American Indians who lived in the Platte River region of Nebraska. After ceding their holdings to the United States government, they settled on a reservation in the present state of Oklahoma, where there is now a remnant of the tribe numbering about 600. The Pawnee were agriculturists and in early days lived in houses made of earth and logs. Their name, meaning *horn,* refers to their custom of wearing a hornlike scalping lock.

PAWPAW. See PAPAW.

PAWTUCK'ET, R. I., in Providence County, four miles north of Providence, on the Blackstone River, at the head of navigation, and on the New York, New Haven & Hartford and several electric railroads. In 1790 Samuel Slater first introduced into the United States at Pawtucket the manufacture of cotton goods, which is to-day the leading industry. Woolen and silk goods, leather, machinery, thread, twine, rope, hosiery, gymnasium supplies, electrical goods and paper are manufactured on a large scale. Calico printing is also important. The thread works are the largest in the country. The city has five parks, the largest of which is Slater Park. Other interesting features are Collyer Monument, a soldiers' monument, Memorial Hospital, a Home for the Aged Poor, an armory and several bridges. The city has the Sayles Memorial Library. The place was settled about 1654, and the town was incorporated as a city in 1885. Population, 1910, 51,622; in 1917, 60,666 (Federal estimate).

PAYNE, JOHN HOWARD (1791–1852), an American writer and actor, best known as the author of *Home Sweet Home.* This famous song, the music of which is an old Italian melody, was first sung in his opera *Clari,* at London, in 1823. Payne was born and reared in New York. At sixteen he was compelled by family reverses to leave Union College, which he had attended two years, and support the family. He turned to the theater, and his acting won for him instant recognition. He wrote a number of original plays and adapted many foreign plays to his uses. Although he became popular throughout the United States and in England, he remained a poor man. In his later years he served twice as United States consul to Tunis, where he died. In 1883 his body was brought back to his native land and interred at Washington.

JOHN HOWARD PAYNE

PEA, a genus of plants belonging to the pulse family, native to Southeastern Europe and Southwestern Asia. The garden pea, one of the numerous species, is one of the most important of table vegetables, while the field pea is extensively grown as stock feed. Several species are extensively cultivated for their blossoms, which are almost unsurpassed for their pure and varied colors and delicate fragrance.

The garden pea may grow as a vine or as a dwarf. It is a beautiful plant, crisp and light green. It produces small white blossoms, which are followed by plump, oblong pods bearing the edible seeds. There are two important varieties, one having smooth pods, the other bearing pods with wrinkled skin—the former usually a dwarf, the latter a climber. Peas have a high food value and are among the most satisfactory vegetables for canning purposes.

PEABODY EDUCATIONAL FUND, a fund bequeathed in 1867 by George Peabody for the purpose of aiding education of both whites and negroes in the South. The fund amounted to about $2,000,000. In 1875 the trustees founded at Nashville, Tenn., a Normal School since known as Peabody Normal College. This institution was broadened in 1909 and became George Peabody College for Teachers. It is now the largest institution of its kind in the South, has about thirty teachers and an average enrollment of 300. The library contains 40,000 volumes.

George Peabody (1795–1869), an American merchant and philanthropist. He served for a time in the War of 1812 and afterwards became head of a large dry-goods business, with branches in New York, Philadelphia and Baltimore. He founded the firm of George Peabody & Company in London and there spent his last years. His most important donation was made for the advancement of education in the South, though he gave large sums elsewhere to promote the arts and sciences.

GEORGE PEABODY

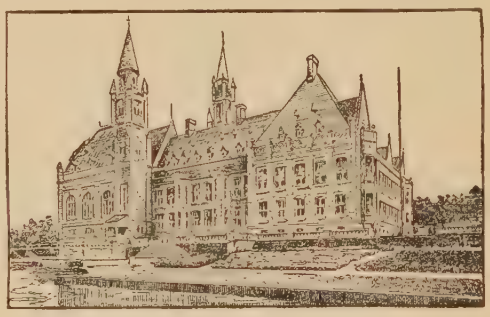
PEACE, Breach of the. Any person who disturbs public tranquillity by taking part in a riot, affray or other disorderly demonstration commits a breach of the peace and is accountable to the law. A breach of the peace may be criminal or non-criminal. Criminal breaches of the peace include the riotous destruction of property and threat to kill; non-criminal breaches include brawls in public places, congregating in unlawful assemblies, tumultuous petitioning, spreading false news, and so on. The law provides each law-abiding citizen the right to live in peace, and any person found maliciously and persistently interfering with his enjoyment of it may be punished by fine or jail sentence, or both.

PEACE, LEAGUE TO ENFORCE. See League to Enforce Peace.

PEACE CONFERENCE, International, a conference of the leading nations which has assembled at different times at The Hague, the ultimate purpose of which was to establish permanent peace throughout the world. The initiative in the movement was taken by Nicholas II, czar of Russia, in 1898, and the first conference met May 18, 1899.

The nations represented were the six great European powers and eight smaller European states, four Asiatic governments, China, Japan, Persia and Siam, and the United States and Mexico. The conference immediately appointed committees and sub-committees, who went into secret session to receive various propositions upon the particular line of work each was to consider. The general conference met every few days to hear and discuss the reports of these committees. On the 29th of July the congress was brought to a close. The three great questions considered were—disarmament, more humane regulations in warfare, and mediation and arbitration.

In regard to disarmament the delegates contented themselves with a declaration of the desirability of an arrest in the increase of the armaments. They also signed resolutions referring the question of the rights of neutrals and private property and of bombardment to a future conference and urging a reduction in the military and naval budgets. The rest of their work consisted of three declarations, against (1) the use of balloons for dropping explosives; (2) the use of shells which give forth deadly gases; (3) the use of bullets which expand when they strike the human body. The American and English delegates declined to sign the second and third clauses of this agreement. The powers, besides, signed three "conventions," one of which applied the humane provisions of the Geneva Convention to naval warfare. Another embodies a perfected code of the rules of war (see International Law).



PEACE PALACE AT THE HAGUE

The convention making arbitration an international duty, and providing a permanent court of arbitration to sit at The Hague, was perhaps its greatest achievement. This convention also made it the duty of all governments to encourage the submission of disputes to the court, and provided for the elaboration of a complete code of arbitration procedure. This convention was in the form of a treaty and was ratified by the United States Senate February 5, 1900.

At a second conference, held in 1907, forty-five nations were represented. This conference adopted thirteen conventions intended

to strengthen the work of international arbitration. During the World War all principles and rules set forth at the Peace Conference were ruthlessly violated, but the war was not looked upon as a general relinquishment of these principles. The most far-sighted statesmen of all nations looked beyond the war to a permanent peace of the world which they hoped the war might bring about. See NATIONS, LEAGUE OF.

PEACE RIVER COUNTY, the name usually applied to the valley of the Peace River in Alberta, Canada. The Peace River is formed in British Columbia, by the confluence of the Finlay and the Parsnip. From this point to the Slave River is a distance of a little over 800 miles. For the first 300 miles of this distance the river flows eastward, and the river valley is little more than a channel worn in the plateau, the land near the river being level or rolling. After the river turns northward, the banks become lower and the valley broadens. Here is a vast fertile country, capable of becoming the home of thousands of people

Until recently the great drawback to the settlement of this region was lack of transportation facilities, but the construction of the Edmonton, Dunvegan & British Columbia and Pacific Great Eastern railways will provide easy access to the valley. Wheat, oats, corn and all garden vegetables can be successfully grown. The meadows are covered with a heavy growth of native grass that makes excellent hay. There is also plenty of timber for use of settlers, so the Peace River county is rapidly developing into a desirable agricultural region.

PEACH, one of the most delicious fruits of temperate regions, closely allied to the plum and cherry, and in value second only to the apple among orchard products. A native of Persia, it is now grown more extensively in the United States than any other country, because of favorable conditions of soil and climate and the employment of up-to-date methods of cultivation. The average annual crop for the whole country is 45,500,000 bushels, California producing the largest amount. In Canada, too, the peach is an important product, especially in Ontario in the vicinity of the Great Lakes; the production in British Columbia is also increasing. The peach is the fruit of a small tree of the rose family, which rarely grows higher than twenty-five feet. It bears long, slender leaves and delicate pink flowers, which appear in early spring.

Outline on the Peach

I. DESCRIPTION
  (1) Tree
    (a) Size
    (b) Shape
  (2) Leaves
  (3) Blossoms
  (4) Fruit
    (a) Characteristics
    (b) Kinds
    (c) Shape
    (d) Flavor
    (e) Size
II. WHERE RAISED
  (1) North America
  (2) Europe
  (3) Asia
III. HARVESTING
  (1) Picking
  (2) Packing
  (3) Shipping
IV. PEACH DISEASES
V. USES
  (1) Food
    (a) Raw
    (b) Cooked
    (c) Dried
    (d) Canned

Questions on the Peach

To what fruits is the peach allied?

In what country is it most extensively cultivated?

What kind of climate does it need? What kind of soil?

Into what classes may peaches be divided?

What is meant by "budding"?

What is the average life of a peach tree?

Kinds of Peaches. Peaches are popularly divided into clingstone and freestone, but these two classes gradually merge into each other in the different varieties, and even the same variety may be clingstone or freestone in different seasons. There are nearly three hundred varieties of peaches grown in North America, which may be roughly grouped as follows:

(1) Peen-to, a flat, medium sized, greenish-white, early peach, suitable for commercial culture only in the hot Gulf states; (2) South

China, a rather small, oval fruit (3) Spanish or Indian, a late peach, nearly always yellow, with a hairy skin; (4) North China, a large, oval fruit; (5) The Persian, which includes the great majority of large, yellow or white fleshed varieties grown in the more northern latitudes. In addition, there are certain smooth-skinned peaches called "nectarines," which are really variations but may be cultivated like other varieties of the peach.

In America peaches are grown in orchards, like apples, but in Europe they are usually trained against walls or other protection and often kept under glass.

How Raised. Nurserymen, who supply stock to fruit growers, propagate the plants from seed. In spring the pits are planted six to eight inches apart in rows wide enough to allow cultivation with horses. In August or September the seedlings are budded (see GRAFTING) with the desired varieties, since the peach does not, as a rule, reproduce true to seed. In warmer climates the budding may be done earlier in the summer. In the North, trees budded one fall are allowed to grow the following season before transplanting to the permanent orchard. Peaches thrive best on light, sandy, gravelly soil, though larger trees will grow if heavier soils are used. High or rolling lands are desirable to insure good soil and air drainage, for the peach must be planted in protected localities free from late spring frosts. Occasionally the trees are thoroughly whitewashed in the fall or winter, because this has a tendency to delay blossoming; planting on a northern slope will sometimes have a similar tendency. In the permanent orchard the trees are set about twenty feet apart each way, though they may be set fifteen feet apart if careful attention is given to pruning and fertilizing. The peach is not a long-lived tree, even under the most favorable conditions, seldom living more than thirty years. The life of a commercial orchard is from seven to nine years; new trees should be added at various times as the old ones die out.

PEACOCK, the male peafowl, a handsome pheasant, having gorgeous iridescent plumage. He is about the size of a domestic turkey, but has a smaller head, which is crested. Unlike many brilliantly colored birds, the peacock's colors are harmoniously combined, green and deep blue predominating. The tail feathers are very long and are marked with eyelike spots. These the bird is able to spread erect into an enormous fan. The hen is smaller than the cock, has no train and is soberly colored. The bird's raucous voice, probably developed for protection in the jungle, does not add to its attractiveness as pets. Peafowls are native to India, Ceylon, Burma, Malaysia and Java, from which countries they have been taken to all parts of the world. The young are not hardy, and are difficult to raise. See PHEASANT.

PEACOCK

PEALE, *peel*, CHARLES WILSON (1741–1827), a famous American portrait painter. After studying under Copley, in Boston, and Benjamin West, in London, he settled in Philadelphia in 1774, where he painted numerous portraits of Revolutionary soldiers and statesmen, among them Nathanael Greene, Horatio Gates, Count de Rochambeau and Baron de Kalb. He executed fourteen portraits of Washington, the best two of which belong respectively to the National Gallery, Washington, D. C., and New York Metropolitan Museum of Art.

PEALE, REMBRANDT (1778–1860), an American portrait and historical painter, son of Charles Wilson Peale. He was an excellent draughtsman, but not so good a colorist as his father. His historical pieces include *The Roman Daughter, The Court of Death* and *The Ascent of Elijah.* A copy of a portrait he made at the age of eighteen

of Washington hangs in the National Capitol. Peale was one of the charter members of the New York Academy of Design and served for a time as president of the American Academy of Fine Arts.

PEA'NUT, or **GOO'BER**, a small vine belonging to the pea family, and the nut which it bears. The latter is extensively used as an article of food, and the plant, probably a native of Brazil, is widely cultivated in warm regions. The edible portion of the peanut is a rounded kernel borne in a pale yellowish,

PEANUT

wrinkled pod. There are one, two or three kernels to a pod, according to variety. A limy soil finely pulverized is considered best for peanut culture. In the spring, when danger of frost is past, the kernels are planted in hills about a foot and a half apart. Two or three kernels, with skins left on, are placed in each hill. The plant takes the form of a hairy stem with numerous branches, bearing small, single, yellow flowers much like those of the garden pea. When a flower falls, the stalk supporting the undeveloped pod lengthens, and bending downward, pushes the fruit into the ground, where it ripens. In the United States the annual crop amounts to more than 60,000,000 bushels, the most coming from Texas, Alabama, Georgia, North Carolina, Virginia and Florida.

Peanuts are roasted and eaten as a delicacy, and they form the basis of many of the modern health foods. An oil used in making salads and as an ingredient of soaps is expressed from the seeds.

PEAR, a favorite fruit belonging to the same family as the apple, the peach and the plum, but most closely resembling the apple. In form it is an irregular cone, with the base hanging downward; the center contains a core with seeds. When ripe, the pear is softer and more juicy than the apple, but the pulp has cells of wood fiber scattered through it. These cells form hard bunches, easily detected when the pear is eaten.

The pear tree resembles the apple tree, but it is smaller. Two varieties of trees are cultivated—the standard and the dwarf. The pear is propagated by budding and grafting. Dwarf trees are grown by grafting on quince as a stock (see GRAFTING). There are many varieties, but the favorites in the United States are the Bartlett, the Anjou, the Le Conte and the Kieffer. The pear is extensively cultivated in France, in the northern part of Italy and in the United States, where the annual crop amounts to from 8,000,000 to 9,000,000 bushels, valued at about $8,000,000. California, New York, Michigan and New Jersey are the states producing the largest quantities. The fruit is picked while green and allowed to ripen slowly, otherwise it decays before fully ripe. Pears are eaten as they come from the tree, and are also canned and dried.

A pearl diver

PEARL, *purl*, a curious and beautiful product of certain mollusks. Nearly all shell-covered marine animals line their shells with a smooth satiny coating to protect their delicate bodies from contact with the otherwise rough covering. This substance exudes from the animal's body and is deposited on the wall of the shell in a series of milky films which harden, forming an iridescent coat known as *nacre*, or *mother-of-pearl*. It sometimes happens that a grain of sand or minute marine animal or other foreign substance finds its way into the shell and irritates the sensitive body of the occupant. Unable to remove the intruder, the little mollusk covers it with layer upon

layer of this same nacreous lining material, and in this way forms the pearl that is so much valued as a gem.

Occasionally the mollusk is attacked by a parasite which bores through the shell. It then deposits its secretion in the form of a half sphere. Pearls formed in this manner are called *blister pearls.* The most valuable pearls are those which are detached from the shell and are of symmetrical shape, either spherical or pear-shaped. The greater the size of such pearls, the greater the value. The largest pearl yet discovered is in the Victoria and Albert Museum, London. It weighs three ounces.

Gem pearls are found chiefly in double, or bivalve, shells, the pearl oyster and giant clam being the chief producers, though valuable specimens have come from fresh-water mussels. The finest pearls are gathered in the East, the most valuable coming from the oysters of the Persian Gulf. Other celebrated pearl-oyster banks are off the coasts of Australia, the Sulu Archipelago, and Lower California. Gem pearls are occasionally found in single, or uni-valve, shells, though these are chiefly valuable for their nacreous lining. The exquisite pink conch shells of the West Indies are used for cameos and the abalone shells of the lower California coast yield a green nacre used for inlay work.

Pearl oysters lie on the sea bottom at a depth of from fifty to one hundred feet, usually in channels between groups of islands, where there are strong currents. They are collected by divers working in crews. The oysters are gathered in shiploads and taken to land, where they are spread out to decompose. They are then washed and the pearls are easily separated.

The fresh-water pearl industry of the United States is large. Although seed pearls of value are found, the chief yield is *mother-of-pearl,* which is used for buttons, the handles of table implements and other like utensils. In Tennessee, Iowa, Kentucky and Wisconsin pearl is an important resource.

PEARY, *pee'ry,* Robert Edwin (1856–), an American Arctic explorer, famed as the discoverer of the North Pole. He was born at Cresson, Pa., and was educated at Bowdoin College. In 1881 he became a civil engineer in the United States navy, and for four years was engaged in making surveys in connection with the projected Nicaragua Canal. He conducted Arctic expeditions in 1891, 1893, 1896 and 1897, published an account of these voyages, *Northward Over the Great Ice,* in 1898, and soon afterwards made another trip, reaching the highest point attained to that time. After a trip in 1905 he published his second volume, entitled *Nearer the Pole.* In 1908 he started out on the expedition which was to culminate in the supreme achievement of his career as an explorer—the discovery of the Pole, which he reached on April 6, 1909. On his return to America Peary was formally thanked by Congress and promoted to the rank of rear-admiral. He has been honored in America and abroad, not only by geographic societies, but by the leading scientific bodies of the world. In May, 1917, Rear-admiral Peary was made chairman of the National Aerial Patrol Commission, but ill health forced him to retire before he became actively engaged.

ROBERT E. PEARY

PEASANTS' WAR, an insurrection of the peasants of Central and Southern Germany in 1524 and 1525. The trouble grew out of a long series of oppressions to which the feudal system had reduced the people, and was the culmination of disturbances that had been going on for fifty years. Aroused and emboldened by the revolutionary wave of the Reformation, the people finally arose, in June, 1524, and a bloody warfare ensued. The insurrection spread through Alsace, the Palatinate, Franconia, Bavaria, Tyrol and Carinthia. The most frightful cruelties were practiced by both nobles and people; thousands were murdered, castles, convents and other buildings were burned. The peasants had thought that Luther would aid their cause, but he wished to keep the religious movement free from political complications, and worked against, rather than for, the peasants. The rising was put down after nearly 100,000 persons had been put to death. The peasants were severely punished, and their condition after the uprising was worse than it had been before; in fact, it was not until the nineteenth century that their rights were recognized and their lot was made easier.

PEAT, a valuable fuel produced by the gradual decay of vegetable matter. Peat is often referred to as coal in the process of making. It is composed principally of dead mosses, but it often contains small twigs and even tree trunks that have fallen and have been kept from rotting. The mosses began to grow many centuries ago and continued branching and intermingling till they formed close-woven mats, which killed the lower parts of the stems. As the moss died below, it continued to grow above. These mosses thrive only in wet places; hence in the course of centuries the areas known as *peat bogs* have been formed.

In Europe extensive areas of peat occur in Russia, Scandinavia, France, Germany, Holland, Denmark, Austria and Ireland. In America the largest areas are found in the United States, Canada and Alaska. The workable peat bogs of Canada have an area of 37,000 square miles, and an average depth of five feet. The deposits in the United States are estimated to aggregate thirteen billion tons. The largest areas occur in the states bordering the Atlantic from New Jersey to Florida, and in the North Central states as far west as North Dakota.

When purified and dried peat is an excellent fuel, but the expense of preparing it has prevented its extensive use in the United States, where coal is abundant. In Ireland and some other European countries, however, it is in general use.

The simplest method of preparing it for fuel is to dig the peat from the bog and cut it into brick-shaped blocks, which are set up to dry. In some localities the peat is ground and purified from the earth and clay by washing. The prepared peat is then run into beds about four inches deep and allowed to dry partially, when it is cut into blocks about four inches square and twelve inches long. These are then stacked and allowed to become thoroughly dry. See COAL; FUEL.

PECAN', a species of hickory, growing in North America and cultivated especially in California and in the Southern states, for the nut. The nut is oblong and has a thin shell. The variety called the *paper shell pecan* has a very thin shell and is the most desirable. Ten years are required for trees to become profitable, though they begin to bear when five or six years old. The raising of pecans is a paying industry in the South. It is estimated that an orchard of twenty acres will produce 10,400 pounds of nuts at the end of ten years. The retail price varies from fifteen to seventy-five cents a pound. See HICKORY.

PEC'CARY, an American wild hog, differing from the domestic hog in having no external toe on the hind feet, a short snout and tusks and only a rudimentary tail. There are several species. The common peccary is found in all warm parts of South America, in Mexico and the southwestern part of the United States. It is small, grayish and bristly, has a mane and a white collar. The white-lipped peccary, found in Guiana, Brazil, Paraguay and Peru, is larger and darker in color. The animals congregate in herds and are sometimes destructive to crops. They are fierce fighters, and a herd will stoutly defend one of its members if attacked. The flesh of the peccary is coarser than domestic pork.

PECOS, *pā'kos*, **RIVER**, a river of New Mexico and Texas, which rises in the Rocky Mountains in San Miguel County, N. M., flows in a southeasterly direction and, after a total course of about 800 miles, enters the Rio Grande. During the hottest weather there is but a slight flow.

PEDAGOGY, *ped'a go ji*, the science of teaching, is a term derived from the Greek word *pedagogue*, meaning *a leader of children*. The Greek pedagogue was a slave who acted as the attendant and protector of a child. Later the Romans applied the term to the slave who taught the child Greek. From this the significance of the term was transferred to one who teaches. Until recently the term *pedagogy* was restricted in its application to the principles and theories of teaching, and the term *education* was applied to these theories and also to whatever measures and systems might be necessary to put them into practice. Recently, however, the term has been so expanded in its application that *pedagogy* is practically synonymous with the *science of education*.

Relation to other Subjects. The laws of psychology form the rules of teaching; consequently, pedagogy is a derived science and is based on psychology. For this reason the study of psychology should precede the study of pedagogy. Since the principles of teaching apply to all phases of instruction, pedagogy is also related more or less directly to all sciences found in courses of study. It relates to biology and physiology, in physical

education; to logic, mathematics and the natural sciences, in intellectual education, and to history, literature and ethics, in moral education.

Fundamental Principles. The science of pedagogy rests upon certain general principles that are now recognized by educators in all countries, though some of these were centuries in gaining universal recognition. Among the most important of these principles are:

(a) **Relation of Mind and Body.** All educators recognize the intimate relation between mind and body. The brain and nervous system constitute the organism through which the mind acts, and we become acquainted with the world about us through the special senses. The mind works better when the body is in a state of health. Defective sense organs are a hindrance to mental activity. Fatigue lessens mental activity, etc.

(b) **Development of the Mental Powers.** The various forms of mental activity develop with the growth of the body. For the order of this development see Psychology, subhead Development of the Mental Powers.

(c) **Attention.** Attention lies at the foundation of all knowledge. It is an act of will and depends upon interest. See Attention.

(d) **Self-Activity.** All knowledge is gained through the self-activity of the learner. The child must educate himself. The duty of the teacher and the parent is to point the way and to remove obstacles too difficult for him to surmount.

(e) **Order of Instruction.** The order of instruction should conform to the order of development of the mental powers. The order universally recognized is (1) observation before reason; (2) the concrete before the abstract; (3) the simple before the complex; (4) from the known to the unknown; (5) facts before definitions and principles; (6) processes before rules.

Modern Movements. Modern systems of education and methods of instruction have been attained only through centuries of effort on the part of those interested in education and the general welfare of the race. The influence of early systems on present movements is so slight that they need no consideration in a brief survey of recent movements. What is known as the *New Education* had its beginning early in the eighteenth century, with the movement from the abstract towards the concrete, and with the growing tendency to give more attention to the individual child. The one to whom the nineteenth century owes the greatest debt for progress in education is Johann Heinrich Pestalozzi (which see). Pestalozzi's principles as set forth below cover the field of education:

(1) The principles of education are sought in human nature. (2) This nature is organic, consisting of physical, intellectual and moral capabilities, ready and struggling to develop themselves. (3) The function of the educator is both negative and positive. He must remove impediments to the learner's development, and he must also stimulate the exercise of his powers. (4) Self-development begins with sensations received through the senses. These sensations lead to perceptions which, registered in the mind as conceptions or ideas, constitute the basis of knowledge. (5) Spontaneity and self-activity are the necessary conditions under which the mind educates itself and gains power and independence. (6) Practical aptness depends more on exercise than on knowledge. "Knowing and doing must, however, proceed together. The chief aim of education is the development of the learner's powers." (7) All education must be based on the learner's own observation; . . . "this is the true basis of all knowledge." (8) What the learner has gained by his own observation has become an actual possession, which he can explain or describe in his own words. (9) The learner's growth necessitates advancement from the near and actual to the more remote; hence, from the concrete to the abstract, from particulars to generals, from the known to the unknown.

The study of psychology (which see) has advanced as rapidly as the study of education, and as a result methods of teaching have been greatly improved. In all civilized countries untrained teachers are now the exception. The relation of the school to the state is more fully understood and the individual as the supreme factor in education is generally realized.

Recent changes in industrial and social life are compelling educators to make their methods of instruction more concrete and to make courses of study more practical. The relations of the school to the community have broadened until the schoolhouse is the center of many community activities. Everywhere the movements of education are toward a more perfect citizenship; a better America.

See Methods of Teaching; Consult Bagley's The Educative Process; Colvin's The Learning Process; Strayer's The Teaching Process.

PED'IMENT, the low, broad, triangular gable at the end of a building of classic style. Across the bottom of it extends the cornice and midway over it meet the two roof ends. The pediments of stone buildings usually are decorated with sculpture. The finest classic examples of pediments are those of the Parthenon at Athens. One of the finest of American pediments is on the Bank of Montreal.

PEDOM'ETER, an instrument somewhat resembling a watch in appearance, by means

of which a walker can estimate the distance he has traveled. The instrument is carried in the pocket and the movement of the body made with each step is registered by a lever. To estimate the distance walked it is necessary to ascertain the length of the ordinary step and multiply this by the number of steps registered. See CYCLOMETER.

PE'DRO II (Portuguese pron., *pa'dro*) (1825-1891), emperor of Brazil, who succeeded to the throne on the abdication of his father, Pedro I, in 1831. Brazil prospered greatly under the rule of Pedro II, who did much to develop its resources in every direction. In 1871 he issued an imperial decree for the gradual abolition of slavery, which totally ceased in Brazil in 1888. He made several visits to Europe, and was deposed by the revolution of November, 1889.

PEEL, ROBERT, Sir (1788–1850), a British statesman, educated at Harrow and at Oxford. He entered Parliament at the age of twenty-one and became Undersecretary for War and the Colonies and later was made Chief Secretary for Ireland. His attitude toward the Irish question brought him into conflict with O'Connell and the extreme Catholic party, and a duel between him and O'Connell was narrowly averted. He established the Irish constabulary while in this office and later established the London police force, which took from him the names of "Peelers" and "Bobbies." He was returned to Parliament in 1817 from Oxford, but some years later his changed views on the Catholic emancipation question led to his defeat. In 1834 and in 1841 Peel was Prime Minister, and during his second term in that office he changed from a Conservative and supporter of protection to a free trader. He also gave his support to a repeal of the Corn Laws (which see).

PEER, a word meaning *equal*, but in England applied only to the nobility who are members of the *peerage*, because each is entitled to a seat in the House of Lords, or Peers. The titles included in the peerage are duke, marquis, earl, viscount, and baron. In the United States the word means *equal*. The law providing that a man accused of a breach of law has the privilege of a hearing before a jury of his peers means that he may be tried by a jury of his fellow citizens.

PEG'ASUS, in classical mythology, a winged horse, created by Neptune from the drops of blood which fell from Medusa's head as Perseus flew with it over the sea. He is said to have flown to Mount Helicon and with a blow of his hoof to have caused the fountain Hippocrene to gush forth. At the Pirene spring where he often drank he was captured by Bellerophon, who bore the hero away to war with the Chimaera. Later the horse was said to have thrown his captor and flown to Heaven.

PE'KIN, ILL., the county seat of Tazewell County, ten miles south of Peoria, on the Illinois River and on the Illinois Central, the Atchison, Topeka & Santa Fé, the Chicago & Alton, the Cleveland, Cincinnati, Chicago & Saint Louis, the Chicago, Peoria & Saint Louis and several other lesser railroads. The city is an important railroad center, in a fertile agricultural district, near productive coal mines. There are manufactures of agricultural implements, wagons, corn products, organs, boilers and boxboard. It has a Carnegie Library and a new hospital. The place was settled in 1829 and was incorporated in 1850. The commission form of government was adopted in 1911. Population, 1910, 9,897; in 1917, 10,973 (Federal estimate).

A city gate

PEKING, *pe king'*, CHINA, the capital of the republic and one of the oldest and largest cities of the world, is situated in the Province of Chi-li, between the Pei-ho and the Hun-ho rivers, 100 miles from the mouth of the river, at the Gulf of Pe-chi-li. It is at the head of the Grand Canal and about fifty miles south of the Great Wall of China. The city is surrounded by high walls, which are entered by sixteen gates. The outer wall is thirty feet high, twenty-five feet thick at the base and twelve feet at the top, with square towers at intervals of about 180 feet, rising to a height of fifty feet and projecting outward in the form of buttresses. The circuit of the walls is about thirty miles. The city is divided by a wall, extending east and west, into two parts, known as the Tartar, or Inner City, which occupies the northern portion, and the Chinese, or Outer City. The wall of the Inner City is fifty feet high.

The Imperial City. The Imperial City, or Tartar City, is entered through gates in the

wall dividing it from the Chinese City, also through gates in the northern wall. Within this part of the city are found the buildings of the foreign legations, which, since the Boxer outbreak in 1900, have been strongly fortified. The Tartar City contains three enclosures, concentrically arranged. The outer enclosure is occupied by the general populace. The second, which is separated from the first by a wall, contains the government offices, temples, parks and an artificial lake.

The Forbidden City. In the center of this enclosure, known as the Imperial City, is the Forbidden City, which was the residence of the emperor and his immediate family and the highest officials. This area is considered sacred and was closed to foreigners, except for special missions. It contains the imperial palace, pleasure grounds, pavilions and reception halls. The walls of this enclosure, together with the roofs of all the buildings, are covered with yellow tiling. Since the establishing of the republic the Forbidden City has been open to foreigners under certain restrictions.

The Chinese City. The Chinese City is the newer portion and was built during the thirteenth century. It contains the greater part of the population and is the business portion of the Chinese capital. Among its important buildings is the Altar of Heaven, with its surrounding temples and shrines; the Temple of Heaven, in which the emperor at midnight in the winter solstice offered sacrifices, and the Temple of Agriculture, near which, each spring, the emperor plowed one or more furrows to inaugurate the opening of the season. The streets in this part of the city are lined with shops, which contain wares of almost every description. While the streets are reasonably broad, only a few of them are paved. Carriages and teams are seldom seen, and transportation is either by small, covered carts or by sedan chairs. Since the occupation of the city by foreign troops in 1900, considerable progress has been made in improving the streets and the sanitary condition.

Industries. The industries of Peking are almost entirely related to the government, only such commercial and manufacturing enterprises being carried on within the city as are necessary to supply the wants of its population.

History. Peking has been settled for so many centuries, that it is not known when it began. It was made one of the capitals by the Khitan Tartars in 937 and was named Nanking, or the Southern Capitol. In 1264 Kublai Khan made it his capital and built the present Tartar City, which was the Kambalu of Marco Polo. It was occupied by the Manchus in 1643 and since then has been somewhat improved. It had never been entered by foreign troops until 1900, when the allied forces took possession of the city and raised the siege of the foreign legations. This occupation continued until September, 1901. The city is connected by telegraph with the important centers of the world, and in 1897 rail connection was established between it and Tien-tsin, later with Mukden and thence with Europe, through the Trans-Siberian railway. Population, about 692,500.

PELAS'GIANS, a prehistoric race, widely spread over the whole of Greece, the coasts and islands of the Aegean Sea, Asia Minor and Italy.

PELEE, MONT. See MARTINIQUE.

PEL'ICAN, the name of ten species of web-footed birds, the striking peculiarity of which is the great pouch that lies under the lower mandibles. Pelicans are larger than swans, have great expanse of wings, and are excellent swimmers but very clumsy on land.

PELICAN

They live in flocks on sea coasts, lake shores, and along rivers, and have voracious appetites, feeding chiefly upon fish, which they capture with great skill. The pouch of naked skin is capable of holding several fish, which the bird may preserve for its own consump-

tion or may carry to its nest for its young, which are fed with food partially digested by the parents.

Among the ten known species, several are American—the *common,* or *white pelican,* of the Mississippi Valley and Canada; the *California pelican,* and the *brown pelican* of the southern sea-coast and the West Indies.

The pelican is used in heraldry as a symbol of mother love and self-sacrifice, for the reason that during the feeding process the mother presses the pouch back against the breast, which gave rise to the ancient tale that the pelican fed her young upon her own blood. The state of Louisiana, known as the *Pelican State,* has this bird for its heraldric device.

PELLAGRA, *pe lag'rah,* a disease affecting the inhabitants of mountainous regions of Italy, Northern Spain and the southeastern parts of the United States. Pellagra has been known in Europe for more than 200 years, but it was not discovered in the United States until 1864. Since 1900 it has developed very rapidly in the latter country, and in 1917 there were 50,000 cases.

The prevailing symptoms are continual abdominal pain, irritability and red and black blotches on the skin. The victims are usually between thirty and forty years of age. The disease is not contagious, and methods of treatment have been discovered which cure eighty per cent of those who contract it when young. The chief cause of the disease is considered to be a diet consisting of the same articles of food for a long time, such as fat meat, bread and molasses. Adding lean meat, peas and beans to the diet usually effects a cure. Injections of sodium citrate and cacodylate are also beneficial.

PELOPONNESIAN, WAR. *pel o pon ne'shan,* See GREECE, subhead *History.*

PELOPONNE'SUS, the peninsula which forms the most southern part of Greece, now called the Morea. It is joined to the remainder of the country by the narrow isthmus of Corinth. The ancient Peloponnesus was divided into six states, Messinia, Argolis, Laconia (Sparta), Elis, Arcadia and Achaea. See GREECE, subhead *History.*

PE'LOPS, in Greek mythology, son of Tantalus, king of Phrygia. Tantalus, who was a favorite with the gods, one day served to some of them a feast, the chief dish of which consisted of his son, Pelops. All the gods recognized the dish that was set before them and refused to eat, except Ceres, who, deep in mourning for her daughter, noticed nothing and ate a part of the boy's shoulder. Pelops was afterward restored to life by the gods, and Ceres replaced the lost shoulder with one of ivory. With the aid of Neptune, Pelops married Hippodamia and succeeded his father-in-law as ruler of the vast kingdom which, according to legend, was called after him Peloponnesus. Atreus and Thyestes were his sons.

PEL'VIS, THE, a bony basin, formed by the two innominate bones and the sacrum. Into the sockets of the innominates are fitted the thigh bones. The lower part of the intestines is in the pelvic cavity. See SKELETON, for illustration.

PEM'BERTON, JOHN CLIFFORD (1814-1881), an American soldier, born at Philadelphia. He graduated at West Point in 1837 and entered the artillery service. He served in the Mexican War and became major after the Battle of Molino del Rey. He resigned from the service at the outbreak of the Civil War, entered the Confederate army and soon was made major general. Pemberton conducted a skilful defense of Vicksburg before a continuous bombardment, from the middle of May until July 4, when he surrendered. After the war he lived as a planter in Virginia and Pennsylvania.

PEMBROKE, ONT., the county town of Renfrew County, on Allumette Lake, an expansion of the Ottawa River, and on the Canadian Pacific and Grand Trunk railways, fifteen miles northwest of Renfrew. There is ample water power for many industries (hydro-electric power) including the manufacture of flour, axes, woolen goods, leather goods, stoves and carriages. There are four machine shops, three foundries and a tannery. The town also has an extensive trade in lumber. There is a convent boarding school and a well-equipped library. The Algonquin National Park is twelve miles distant. Population, 1911, 5,626.

PEM'MICAN, the name of a food formerly prepared and extensively used by the Indians living in the northern part of North America. Originally it consisted of dried lean meat, of the buffalo or deer, pounded to a powder and mixed with boiling fat, then pressed into cakes and packed in cases until needed. Beef is now used in the place of buffalo or deer meat; this innovation was introduced by Gail Borden (1801-1874), who

later became famous for the manufacture of condensed milk. When properly prepared, pemmican contains a large amount of nourishment in a small space. For this reason it is still used by hunters and traders who travel long distances through the sparsely settled regions of Canada, and by explorers in the polar regions.

PEN, an instrument for writing. Pens have been in use from very early times, and in each age they were adapted to the material on which the characters were to be made. The Roman's pen consisted of a metal stylus with a stiff point and was used for writing on tablets coated with wax. In Greece and in Eastern countries a hollow reed was used, and this undoubtedly led to the quill pen. Quill pens were made of the quills of the goose and crow and were used for several centuries before they were replaced by metal pens. The quills were taken from the wings of the bird and placed in hot sand until dry, when the pen was made by whittling the quill into shape with a small knife.

Steel Pens. We do not know when or by whom the steel pen was invented, but the manufacture of steel pens by machinery was begun by Joseph Gillott in 1820. He succeeded in making a pen of thinner and more elastic steel and in giving it a better temper and finish than had been previously done. The method which he established has, with some improvements, been followed until the present time.

Pens are now manufactured by machinery. Steel of the best quality is used. This is rolled into thin sheets six feet long and about one and one-half feet wide. These sheets are cut into strips, equal in width to the length of two pens. The strips are then heated to a dull red, in tight iron boxes, and allowed to cool slowly. When cooled they are cleaned and rolled with great care to the necessary thickness. Blanks, of the shape and size of the pen, are then punched from the plates. The blanks are then stamped and slit on each side of the point, so as to make the pen more flexible. They are then heated and rounded by being stamped with a die, which fits into a mold. The pens are then tempered, and the points are ground and split. The pens are then sorted, the imperfect ones being thrown out, and the others packed in boxes of one gross each. The annual output of steel pens for the world is estimated at from ten to twelve million gross, of which two and a half million gross are made in the United States. Birmingham, England, is the leading center of the industry.

Other Pens. Gold pens are valued for their durability and flexibility. They have iridium points. Fountain pens have a hollow holder which is filled with ink that flows as the pen writes. Thomas A. Edison has invented an electric pen which perforates the paper and makes a stencil from which any number of copies of the writing can be made.

PENANCE, *pen'ans*. In the Roman Catholic Church any member guilty of a spiritual offense is expected to make confession to his priest, who imposes upon the sinner some disciplinary punishment and grants absolution after compliance with his demands. Penance therefore implies *contrition, confession* and *satisfaction*—the atoning for an evil deed with a good one. The authority for the sacrament is found in *John* XX, 23: "Receive ye the Holy Ghost; whose sins ye shall forgive they are forgiven them; whose sins ye shall retain they are retained."

PENANG', an island belonging to Great Britain, lying at the north entrance of the Malacca Strait, off the western coast of the Malay Peninsula. Its area is 107,000 square miles. The greater part of the surface is level, although there is a mountainous tract in the north. The island produces cocoanuts, areca, pepper, nutmegs, cloves, rice, sugar, coffee and indigo. There are large supplies of tin in the mountainous region. Georgetown, the capital and port of the settlement, is a growing town with a large commerce. Population, about 278,000.

PEN'CIL. The ancient Egyptians used lead for marking on papyrus, and the Romans used small bars of it for the same purpose. From this early use of lead we get the name *lead pencil,* though the so-called lead pencil to-day contains no lead whatever. When men learned that graphite would make a blacker mark than lead that substance was named *black lead,* and for nearly 400 years it has given its name to the pencil in common use.

Manufacture. In the manufacture of pencils powdered graphite, free from all impurities, is mixed with pipe clay, the quantity depending on the degree of hardness required. For hard pencils they are mixed in equal parts, and for ordinary writing pencils the proportions are seven parts of clay to ten parts of graphite. After being ground to-

gether with water for several hours, the doughy mixture is shaped into leads, by being placed in an iron cylinder, with a plate in the bottom, which has holes of the same size as the leads to be made. By the use of a piston, worked by a screw, the mixture is squeezed out in coils through the holes. While wet, the coils are straightened, cut into pieces and allowed to dry. Pine and red cedar are generally used for casing. The wood, cut into little slabs the width of six pencils, is passed through a machine which makes the grooves. The graphite sticks are placed in these grooves, and another grooved slab is glued to it. When dry the blocks are cut into pencils, by being run through a machine with revolving knives, and are then finished.

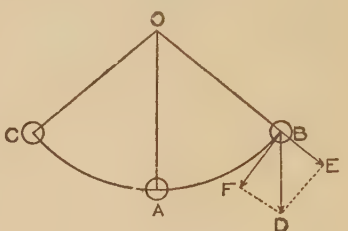
The world's product of lead pencils probably amounts to nearly two thousand millions a year, half of which are made from American-grown cedar. The United States makes about 750,000,000 a year, or more than eight pencils for each of its inhabitants. The annual output is valued at about $7,400,000.

Other Pencils. Colored pencils are made by mixing colored clay or chalk with wax and enclosing it in a case of wood or paper. Slate pencils are made of soft slate, and may be encased in wood but they usually consist of a small rod of slate. Pencils for marking on glass or crockery are made of wax colored with lampblack or ivory black.

PEN'DANT, in architecture, a hanging ornament, used in the vaults and timber roofs of Gothic buildings, more particularly in late Gothic work. In vaulted roofs, pendants are of stone and commonly are between two arches; in timber roofs, they often occur at the intersection of beams.

PEN'DLETON, Ore., the county seat of Umatilla County, forty-five miles southwest of Walla Walla, Wash., on the Umatilla River and on the Washington & Columbia River Railroad and the line of the Oregon Railroad & Navigation Company. Four bridges cross the river. The town is in a great wheat-growing region. The river furnishes good water power, and there are flour and woolen mills, wool-scouring plants, machine shops, and other factories. There are two academies, a Carnegie Library, a Federal building and the state hospital for the insane. Population, 1910, about 5,000.

PEN'DULUM, a weight suspended from a fixed point, so that it will swing freely to and fro by the force of gravity and the impulse which it receives from its own motion. A small, heavy body, suspended from a fixed point by a string and caused to vibrate without much friction, is the simplest form of pendulum. In the figure, *A* is the weight, *O* the point of suspension, and *B* and *C* the ends of the path over which the pendulum swings. The path *CAB* is called the *arc,* and the movement of the pendulum from *B* to *C* constitutes a *vibration.* The force of gravity tends to draw the ball at *B* in the direction of *BD,*



but the resistance of the string, *OB,* causes it to take the direction of the resultant, *BF,* which is at right angles with *BE,* and thus to swing in the arc *CAB.* The distance from the lowest point in the arc to either end, as *AB* and *AC,* constitutes the *amplitude* of the vibration. Clock pendulums are usually made by the hanging of a circular piece of metal, called the *bob,* or *disk,* to a wire, which is attached by its upper end to the frame of the block.

The time of vibration of a pendulum depends upon its length. A pendulum which will vibrate seconds in the latitude of New York is about 39.1 inches or .993 of a meter long. The vibrations are governed by the following laws:

(1) In the same pendulum, all vibrations of small amplitude are made in the same time.

(2) The time of vibration of different pendulums are proportional to the square roots of their respective lengths. If a pendulum to vibrate seconds must be 39.1 inches long, one to vibrate three times as fast would have to be one-ninth as long.

(3) The time of vibration for the same pendulum will vary in different places, since it decreases as it is moved from the equator to the poles.

Since the rod in most clock pendulums lengthens in summer and shortens in winter, it is necessary that means for preserving the uniform length of a pendulum be provided. In clocks known as regulators, such as are used by watch makers, the pendulum rod consists of a frame of rods of different metals, so arranged that as some expand downward, others expand upward, thus keeping the mean length of the pendulum the same.

Another style, known as the mercurial pendulum, has but one rod, but the weight consists of a cup containing mercury. As the rod lengthens, the mercury expands upward, and as the rod shortens, the mercury contracts downward, thus preserving the length of the pendulum. See CLOCK.

PENEL'OPE, in Greek mythology, the wife of Ulysses. Shortly after the birth of his son Telemachus, Ulysses went with his countrymen to war against Troy. During the twenty years of his absence Penelope was besieged by suitors, who tried to make her believe that Ulysses was dead. She attempted to rid herself of them by promising them that she would choose one of them as soon as she had finished a piece of tapestry which she was weaving. Each night, however, she raveled what she had done during the day. When her suitors became aware of this ruse they grew more clamorous, and Penelope then promised that she would marry any one of them who on a certain day should bend the bow of Ulysses, knowing well that none of them was strong enough to do this. When the day of the trial came, an aged beggar who had made his way to the palace entered with the suitors and, after they had all tried, took the bow and bent it easily. He then threw off his disguise, showed himself as Ulysses and put the suitors to death.

PENGUIN, *pen'gwin,* a queer-looking bird of the Antarctic region, having a ducklike body and varying in size, according to species, from eighteen inches to three feet. The wings, which are short and covered with scalelike feathers, are useless for flight. On shore the penguins are awkward birds; they walk queerly about on their short legs or crawl over the ice and snow with the aid of their wings; in the water, however, they are graceful, rapid swimmers, using their wings as paddles.

They are protected from the intense cold by a layer of fat under the skin. They live and breed in colonies, and the male and female share the labor of incubation. Usually one egg is laid, and this the bird holds between the thighs until it is hatched. Of the fifteen species, the king penguins are the largest. Silvery-white breasts, blue-gray backs and wings, black heads and yellow throats give these birds a striking appearance. When Amundsen, the Antarctic explorer, reached the South Pole the penguins there saw men for the first time. They were not at all afraid of the newcomers, and even showed a lively interest in them, intelligently imitating some of their movements.

PENGUIN

PENIN'SULAR WAR, a seven-years' struggle in Spain and Portugal between those countries and France. England aided them against the inordinate ambition of Napoleon. After Nelson had destroyed the French fleet at Trafalgar, Napoleon, fearing an invasion of the British by way of the Iberian Peninsula, subjugated the country and placed his brother Joseph Bonaparte on the Spanish throne. The Spanish and Portuguese peoples rose in defense of their liberties and waged a fierce guerrilla warfare against the invaders. Of the memorable struggle which ensued, the main features were the retreat of Sir John Moore to Coruña, and his death there; the accession of Sir Arthur Wellesley, afterwards Duke of Wellington, to the supreme command; his formation of the celebrated lines of Torres Vedras, where he held the French armies in check until he had accomplished the complete liberation of Portugal, and his subsequent victorious march through

Spain, marked by the great battles of Salamanca and Vitoria.

PENN, WILLIAM (1644-1718), the founder of the state of Pennsylvania, and the most widely-known member of the Quakers, or Society of Friends, was born in London. His father was an English admiral and a man of wealth. Penn was educated at Essex and Christ Church, Oxford. While in college he was converted to the Quaker belief. He left college and was driven from home by his father, but was afterwards sent to France and Germany, where he became acquainted with many people of broad religious views. Penn's stay in France and Germany seemed to have driven all Quaker ideas from his mind, and upon his return his father placed him in charge of several large estates in Ireland. Here he met Quaker influence again and was again converted.

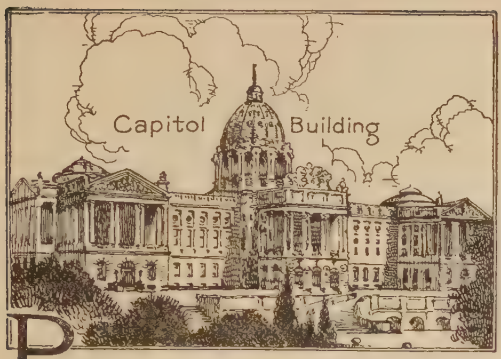
Later Penn became a Quaker preacher, and on account of an essay, entitled *The Sandy Foundation Shaken,* was imprisoned in the Tower of London for seven months. During this time he wrote his most celebrated work, *No Cross, No Crown.* The persecutions of Dissenters continuing to rage, Penn turned his thoughts toward the New World. From his father he had inherited a claim upon the government of $80,000, and in settlement of this claim the government in 1681 granted him large territories in North America, including the present state of Pennsylvania, with the right to found a colony or society with such laws and institutions as expressed his views and principles. A settlement was established in 1682, and a little later Penn came to America and laid the foundations of his colony on a more free and democratic basis than had at that time been allowed in the world. Members of all denominations and countries gathered there; the city of Philadelphia was laid out upon the banks of the Delaware, and the colony soon came into a most flourishing condition. The founder remained in the province about two years, when he returned to England, remaining there about fourteen years.

WILLIAM PENN

Penn was on friendly terms with Charles II and James II and when William and Mary came to the throne he was accused of treasonable intentions and for three years he hid himself in London. He was finally acquitted, and in 1699 he again sailed for Pennsylvania, intending to make it his future residence. However, he returned to England in 1701, leaving the management of his affairs to an agent named Ford, by whose dishonesty Penn was financially ruined. When Ford died he left claims against Penn that were pressed to such a degree that Penn allowed himself to be thrown into prison to escape extortion. His affairs were finally adjusted by his friends and he was released, but the imprisonment injured his health, and he died in 1718. Because of his liberal views concerning religion and government, and his kindness and fair dealing with the Indians, William Penn is regarded as one of the leading characters in American history.

PEN'NACOOK, a word which meant *crooked place,* was the name of a tribe of New England Indians, inhabitating Southern Maine, New Hampshire and Massachusetts. They were at first friendly with the English, but later turned from them. The English settlers took their lands until the Indians were rendered practically homeless, and the chief had to petition for enough land to live upon. There was peace until a number of Indians were seized through treachery. What remained of the tribe of over 3,000 Pennacooks sought refuge in Canada, and they gave the French assistance in the French and Indian Wars.

PENNELL, *pen'el,* JOSEPH (1860–), one of the foremost American etchers and lithographers, also a writer of distinction. He was born in Philadelphia and studied at the Pennsylvania Academy of Fine Arts and the Pennsylvania School of Industrial Art. Since 1884 he has lived chiefly in London. In Europe Pennell is the most widely known of American graphic artists, and his etchings, drawings and lithographs form part of the collections of all the great galleries. His writings include *A Canterbury Pilgrimage, An Italian Pilgrimage, Our Sentimental Journey through France and Italy, Pen Drawing and Pen Draughtsmen.* In collaboration with his gifted wife, Elizabeth Robins Pennell, he wrote *Lithography and Lithographers* and *The Authorized Life of J. McN. Whistler.*



PENNSYLVANIA, the second largest of the North Atlantic states, and one of the foremost American commonwealths in wealth, population and industrial progress. New York alone exceeds it in value of manufactures and number of inhabitants, while in mineral resources it far outranks any other state. The name of the state is a combination of that of its Quaker founder, William *Penn,* and *sylvania,* which means *woodlands.* KEYSTONE STATE, the popular name, refers to its position at the center of the arch formed by the thirteen original states, of which Pennsylvania was considered an important member.

Location and Size. The southernmost of the North Atlantic group, Pennsylvania touches West Virginia, Maryland and Delaware on the south. West Virginia and Ohio are on the west, Lake Erie and New York are north; on the east the state is separated from New Jersey by the Delaware River, which also forms for a short distance the boundary between New York and Pennsylvania. Except for its water boundaries, Pennsylvania has straight bounding lines, and in shape is a fairly regular rectangle. Nowhere does it touch the Atlantic coast, but the Delaware Bay and River enable the largest ocean vessels to visit Philadelphia, fifty-five miles from the ocean.

With an area of 45,126 square miles, Pennsylvania is the thirty-second state in the Union in size. Mississippi, which is nearest it in area, is larger by 1,639 square miles. Of the gross area, 294 square miles are water. Among the North Atlantic states only New York is larger.

People and Cities. In 1910, when it had 7,665,111 inhabitants, Pennsylvania ranked second among the states in population, and has continued to hold this place. By July, 1918, the population had increased to 8,798,067, according to a Federal estimate. In density of population the state held sixth place in 1910, with 171 persons to the square mile.

Pennsylvania has a large percentage of negroes; in 1910 they numbered 193,919. Among the 1,442,374 foreign-born inhabitants, the most numerous racial groups were German, Irish, English and Austrian. The chief religious denominations are, in order, Roman Catholics, Methodist, Lutheran, Presbyterian and Reformed. As the old colony was a center of religious toleration, Pennsylvania still has a number of sects not found elsewhere in the United States in great numbers. Among these are Mennonites, Schwenkfelders, Moravians and Dunkards. The state is still a stronghold of the Quakers, or Friends.

Cities. Over three-fifths of the people live in towns or cities, and Philadelphia, the metropolis of the state, ranks third among the cities of the Union, following New York and Chicago. In 1917 its estimated population was 1,735,514. The next four, in order of size, with Federal estimates for 1917, are as follows: Pittsburgh (586,196); Scranton (149,541); Reading (111,607); Erie (76,592). Harrisburg, the capital, was credited with 73,276 inhabitants in 1917. (For list of important municipalities described in these volumes, see end of article.)

Surface and Drainage. The surface of Pennsylvania is divided into three distinct regions. The southeastern region, which comprises that portion of the state lying to the east of the first range of mountains, is a part of the Piedmont plateau. This portion of the state is at sea level, and the surface rises by gradual slopes from this low plain to an altitude of 500 feet at the foot of the mountains. The surface is somewhat rolling, and is crossed in a number of places by chains of hills. The largest of these, known as South Mountain, extends entirely across the state, in a southwest and northeast direction. The second, or highland region, comprises the mountainous section, which extends across the state from the northeastern corner in a southwesterly direction. Beginning with the low ridge known as South Mountain, this region comprises several parallel ranges of mountains separated by intervening valleys. The most important of these on the east is Blue Mountain, which in New Jersey is

known as the Kittatinny Range; through this the Delaware River cuts its way, forming the famous Delaware Water Gap. West of Blue Mountain are a number of ranges with different names, all of which belong to the Alleghany Mountains. All of these mountains have steep slopes on the eastern side and gradual slopes on the western. The highest point, Blue Knob, is 3,136 feet above the sea. Streams flow through the intervening valleys, and the Susquehanna cuts its way across the ranges. Much of this region is covered with forests. The third region, known as the Alleghany plateau, lies to the west of the mountain range. This is a high plateau, varying in altitude from 1,000 to 2,500 feet and containing many deep valleys and steep slopes, formed by streams which have worn their channels through the soft strata underlying the surface. On the northwest this high plateau extends almost to Lake Erie.

The eastern part is drained by the Delaware River, which receives a number of short tributaries. The most important of these are the Schuylkill and the Lehigh, the former entering the Delaware at Philadelphia and the latter at Easton. The Susquehanna River drains the northeastern and central parts. It is formed by a north and a west branch, which unite at Northumberland, and flow entirely across the state in an irregular course. It receives numerous tributaries, most of them shallow, rapid mountain streams, the largest being the Juniata. The Alleghany plateau is drained principally by the Ohio and the two great streams from which it is formed, the Alleghany and the Monongahela. The region bordering on Lake Erie is drained into the Potomac River. There are in the mountains occasional tarns, or mountain lakes, but Pennsylvania has no lakes of any importance.

Climate. The climate varies in the three natural divisions. In the northwest and west, heat and cold are excessive, and changes are abrupt. In the north and mountain regions, the winters are severe, and the summers are delightfully cool. The climate of the eastern section is marked by irregular alternations of the seasons, but the state is, in general, healthful. The mean temperature at Philadelphia is 54°. The average annual rainfall for the state as a whole is 44.6 inches. Heavy snows fall on the mountains in winter, and the rivers of the western half of the state are often flooded in the spring.

Mineral Resources. Pennsylvania contains large deposits of both anthracite and bituminous coal. The anthracite mines are found at Wilkesbarre, Hazelton, Shenandoah, Ashland, Pottsville and Scranton and the output exceeds that of any other state or any country, reaching a total of 80,000,000 to 90,000,000 tons a year. In the western part of the state are extensive measures of bituminous coal. These are located in the Monongahela City, Irwin, Mercer, Towanda, Connellsville, Johnstown, Idlewood and Clearfield districts. The annual yield of these fields is between 150,000,000 and 200,000,000 tons. Many of the coal measures contain layers of sandstone, iron ore, limestone and fire clay between the seams of coal. Coke, a variety of charcoal obtained from bituminous coal, is produced in great quantities, the output surpassing that of all the other states combined.

Pennsylvania is also the leading state in the production of cement. The Lehigh district, which includes one county in New Jersey, is the source of nearly one-third of the entire American output. In total value of clay products the state is surpassed by Ohio, but in the single production of brick and tile it ranks first. In the output of natural gas Pennsylvania ranks second, following West Virginia, and the value of the anual yield is over $100,000,000. Petroleum, another important fuel, is still being produced in paying quantities, but Pennsylvania no longer leads the states, as it formerly did. The annual yield is between 7,000,000 and 8,000,000 barrels of forty-two gallons each.

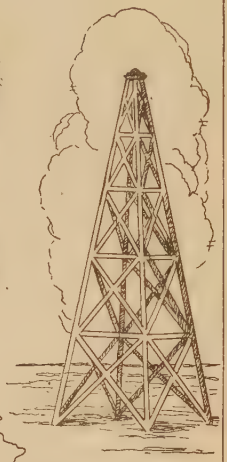
In the production of stone, slate, sand, gravel and lime the state holds first place, the annual yield of slate alone being over half that of the total production of the United States. Other mineral products include iron ore, feldspar, graphite, copper, glass sand, metallic paints and mineral waters. The annual value of all minerals is over $460,000,000.

Agriculture. The valley lands of Pennsylvania are remarkably fertile. There are about 216,000 farms; the cultivated area is over 18,500,000 acres. The production of hay and cereals, market gardening, fruit and flower growing and forestry are all important branches of agriculture. In point of acreage hay is the leading crop, and the annual harvest is over 4,000,000 tons. Among the cereals corn ranks first in yield, followed by

PENNSYLVANIA

State Seal

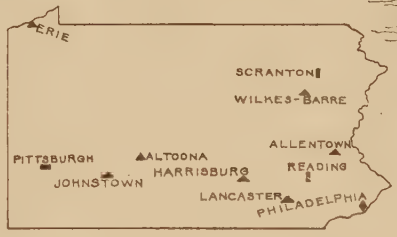
Memorial Chapel at Valley Forge



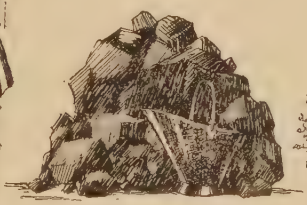
An Oil Well

Key to Population

- ♦ More than 1,500,000
- ▬ Between 500,000 and 600,000
- ▮ Between 100,000 and 150,000
- ▲ Between 50,000 and 100,000



Betsy Ross House, Arch Street, Philadelphia



275,000,000 Tons of Coal Mined Every Year

William Penn's Mansion, Fairmount Park, Philadelphia

Independence Hall, Philadelphia

oats, wheat and rye. The annual corn harvest is over 60,000,000 bushels. Pennsylvania is surpassed only by New York in the production of buckwheat, and only by Maine and New York among Eastern states in its output of potatoes. Pennsylvania is also one of the first ten states in tobacco production.

In the southeastern part climatic conditions favor the production of fruit, and here are flourishing orchards of apples, peaches and pears. Cherries, apricots and plums are also cultivated, and in the district bordering on Lake Erie grapes are grown abundantly. The state is among the first five in value of dairy products, is first in value of poultry, and its live stock is valued at over $180,000,000. There are about 915,000 sheep in the state, the annual wool clip being about 4,000,000 pounds.

Manufactures. Ranking second among the states in total value of manufactured goods, Pennsylvania leads them all in the manufacture of iron and steel products, and it possesses in the city of Pittsburgh the center of the largest steel and iron district in the world. Here is made everything from wire nails to locomotives and structural bridgework. Among the establishments in the Pittsburgh district are plants of the United States Steel Corporation, the Westinghouse Air Brake Company and the Westinghouse Electric Company. The main plant of the famous Baldwin Locomotive Works is at Philadelphia. In the state as a whole there are over 2,300 establishments devoted to the manufacture of metal and metal products.

Second in value of products is the textile industry, and in this branch of manufacture Pennsylvania is surpassed only by Massachusetts. Among the products represented are woolens, worsteds, silks, felts, knit goods, cotton fabrics and hosiery. Philadelphia is the foremost city in the manufacture of textiles. Tanning and the finishing of leather, in which Pennsylvania ranks first in the Union, printing and publishing, glass making, shipbuilding and slaughtering and meat packing are other major industries. There are over 100 lines of manufacture in which Pennsylvania ranks first, second or third, and out of 264 classifications compiled by United States Census Bureau, 245 are credited to the Keystone State. They include almost every commodity used in the home or in the business world, and their products go to all parts of the earth.

Transportation. The state has excellent transportation facilities. Lake Erie gives access to the Great Lakes, and the Ohio makes accessible the Mississippi route, while the Delaware and other navigable streams, together with numerous canals, provide water connection with markets in various sections of the country. The state is surpassed only by Texas and Illinois in railway facilities, its steam mileage being about 11,600. There are, besides, over 4,000 miles of electric railway, and about the same number of miles of paved highways. The leading railroads in respect to mileage are the Pennsylvania, the Delaware, Lackawanna & Western, the Philadelphia & Reading, the Lehigh Valley, the Delaware & Hudson, the Central of New Jersey, the Erie and the New York Central.

Education. The present system of education dates from 1834, when Pennsylvania established a system of free public schools. The schools are under the direction of the superintendent of public instruction. Counties are divided into districts, each of which usually includes a township. The schools of the districts are managed by boards of directors elected by the people, and these boards within the county elect a county superintendent. All cities have excellent systems of graded schools, but in some of the rural sections the attendance is small. Vocational courses are now included in the curriculum of certain schools. School attendance is compulsory for pupils between the ages of eight and sixteen, but in rural districts attendance may be reduced to seventy per cent of the term.

The state maintains thirteen normal schools, distributed among as many normal districts. The Pennsylvania State College, located at State College, devotes special attention to modern industrial pursuits and to agriculture. The most important educational institution, the University of Pennsylvania, is not a state school. Other higher institutions of learning include Dickinson College at Carlisle, Lafayette College at Easton, Lehigh University at South Bethlehem, Haverford College at Haverford, University of Pittsburgh and the Carnegie Institute of Technology at Pittsburgh, Swarthmore College at Swarthmore, Temple University at Philadelphia and Bryn Mawr College at Bryn Mawr, the latter a famous institution for women.

Government. The legislature consists of a senate of fifty members and a house of repre-

Items of Interest on Pennsylvania

The state motto is "Virtue, Liberty, Independence."

William Penn wished to have the colony called simply Sylvania, but Charles II, king of England, insisted that Penn be prefixed.

The triangular section in the northwestern part of the state bordering on Lake Erie was purchased by early settlers from the national government for the purpose of giving Pennsylvania a port on the Great Lakes.

During the Revolutionary period Benjamin Franklin was the most distinguished citizen of Pennsylvania. He was buried in the churchyard at Fifth and Arch streets, Philadelphia.

According to recent statistics there are in the state over 16,300 manufacturing establishments, employing about 881,000 wage earners.

Pennsylvania was the first state in the Union to establish a state police force. The second one to do so was New York, which adopted the plan in 1917.

The home of Betsy Ross, who made the first American National flag, is preserved as a memorial. It is located at 229 Arch Street, Philadelphia.

Originally Pennsylvania was one of the most densely forested states in the Union, but the virgin timber has been largely cut. The present forest growth covers about half the area of the state, and includes white and yellow pine, hemlock, hickory, elm, maple, beech, chestnut and walnut.

The state is governed by the constitution which went into effect in January 1874. It was the fourth to be adopted.

Of the millions of school slates bought and used every year, over 6,000,000 are made in Pennsylvania.

At Johnstown a terrible flood occurred in 1889, causing the loss of more than 2,200 lives. It resulted from the bursting of the dam at Conemaugh Lake, the source of the city water supply.

Pennsylvania abolished hanging as a punishment for crime in 1913, substituting electrocution.

Questions on Pennsylvania

From what words is *Pennsylvania* derived? Where did the state get its nickname *Keystone?*

What are the land boundaries of Pennsylvania?

Has it any Atlantic seaports?

Compare New York and Pennsylvania as to population, size, manufacturing importance and mineral wealth.

Make the same comparisons, using Illinois in place of New York.

What was the percentage increase in population between 1910 and 1918?

What interesting religious sects are found in the state?

Are there any high mountains in the state?

What is the most picturesque scenic feature of Pennsylvania?

How does the state compare with other sections on the globe in regard to anthracite?

In what mineral products does the state take first rank in the Union?

What branches of agriculture prosper in the state?

What is the greatest iron and steel district on the face of the globe?

What is the state's rank in the production of textiles? In leather finishing?

How is the number of members elected to the state house of representatives determined?

What provision does the state make for defectives?

What racial group made the first settlement in Pennsylvania?

Where was the Declaration of Independence signed and the Constitution adopted?

If a visitor in Philadelphia would you care to visit 229 Arch Street?

What was the cause of the Johnstown flood?

What event was celebrated in Philadelphia by the Centennial Exposition?

How does the Delaware River contribute to the commercial progress of the state?

sentatives whose number depends upon the population, apportionment being made after each Federal census. From 1910 to 1920 the house had 205 members. The senators are elected for four years, and the representatives for two years. One-half of the senators retire every two years. The head of the executive department is the governor, elected for a four-year term. Other important officers are a lieutenant-governor, secretary of the commonwealth, treasurer, auditor, adjutant-general, attorney-general, superintendent of public instruction, commissioner of labor, commissioner of highways and secretary of agriculture. The courts consist of a supreme court of seven judges, elected by the people for twenty-one years and not eligible for reëlection; superior courts, which are held in the various judicial districts into which the state is divided; courts of common pleas and quarter sessions, besides local courts, established in towns and cities.

Institutions. There are thirty penal and benevolent institutions wholly supported by the state, and seven semi-state institutions, besides hundreds of private homes and hospitals receiving state aid. The deaf and dumb, the blind, the feeble-minded, epileptics and other defectives are given the best scientific treatment available. Among the state institutions are the hospitals for the insane at Allentown, Danville, Fairview, Harrisburg, Norristown, Warren and Warnersville; the Pennsylvania Oral School at Scranton; an industrial reform school at Huntington, a reformatory at Morganza, an industrial training home for women at Muncy Station, and penitentiaries at Pittsburgh, Bellefonte and Philadelphia.

History. The first permanent settlement in the state was made by the Swedes in 1643, near the present site of Chester. It was taken by the Dutch in 1655 and by the English in 1664. The whole territory was granted by Charles II to William Penn in 1681, and the following year the capital of his province, Philadelphia, was founded. Penn organized a very liberal government and attracted to his colony many persons who had suffered persecution in the Old World. However, Pennsylvania became extremely disorderly, and at several different times the colony was taken from Penn, but was each time restored. During the French and Indian Wars, Pennsylvania refused to coöperate with the other colonies, but it suffered much through the raids of the Indians and French, and at the close of the wars it erected a costly chain of forts on its frontier.

The state was engaged in a long dispute with Connecticut over the Wyoming Valley, and in 1778 it culminated in the massacre at that place. Pennsylvania took an active part in the Revolutionary War, and organized an independent state government in 1776. Philadelphia was the seat of the Congress during the war, and important military events also took place within the borders of the state. The Federal Constitution was adopted at Philadelphia in December, 1787. During the war between the states, Pennsylvania was a Union state and furnished many troops for the Federal armies. The state was three times invaded, the last time by Lee's army, which was defeated at Gettysburg. Later events of interest were the Centennial Exposition (1876), the Johnstown flood (1889), the Homestead strike (1892) and the anthracite coal strike (1902). Since the Civil War the state has been a Republican stronghold.

Related Articles. Consult the following titles for additional information:

CITIES

Allentown
Altoona
Butler
Carbondale
Carlisle
Chambersburg
Chester
Columbia
Connelsville
Dubois
Dunmore
Duquesne
Easton
Erie
Franklin
Greensburg
Hazleton
Johnstown
Lancaster
Lebanon
McKeesport
Meadville
Mount Carmel
Nanticoke
New Castle
Norristown
Oil City
Philadelphia
Pittsburgh
Pittston
Plymouth
Pottstown
Pottsville
Reading
Scranton
Shamokin
Shenandoah
South Bethlehem
Sunbury
Uniontown
Washington
West Chester
Wilkesbarre
Williamsport
York

GEOGRAPHY

Appalachian Mountains
Allegheny (river)
Delaware (river)
Delaware Bay
Delaware Water Gap
Lehigh River
Monongahela River
Ohio River
Schuylkill (river)
Susquehanna River

MISCELLANEOUS

Franklin, Benjamin
Gettysburg, Battle of
Independence Hall
Mason and Dixon's Line
Penn, William
Ross, Betsy
Valley Forge
Wyoming Valley Massacre

PENNSYLVANIA, UNIVERSITY OF, an institution of higher learning, located in Philadelphia. It is one of the largest universities in North America, and originated in a charitable school founded in 1740. In 1751 the school became an academy, which was raised to the rank of a college in 1775. In 1791, by

act of the legislature, it was made the University of Pennsylvania. The following departments are now maintained: the College; the School of Arts; the Wharton School (offering courses in commerce and finance); the Towne Scientific School; departments of education, law, medicine, dentistry and veterinary medicine; a graduate school; the University Hospital; the Wistar Institute of Anatomy and Biology; the Laboratory of Hygiene; the Veterinary Hospital; an institute for the study of tuberculosis; a psychological clinic, an astronomical observatory and a department of physical education. The graduate department is coeducational, but all other departments are for men only. The library contains 450,000 volumes, and the student enrollment is about 8,000. There are over 600 instructors.

PENNY, *pen'i*, a bronze English coin, which weighs 145.833 Troy grains and is worth, intrinsically, about one-fourth of its face value. It is equivalent to four farthings, or one-twelfth of a shilling in English money and to two cents in United States and Canadian money. Its similarity to the Roman coin *denarius* led to the adoption of *d*, the abbreviation of that name, as its symbol; thus 12 s. 6d. is 12 shillings, 6 pence. In the United States the one-cent piece is sometimes called a penny.

PENNYROY'AL, the American name of a medicinal herb belonging to the mint family. The plant is found from Florida to Cape Breton Island and as far west as Nebraska. It grows to be a foot or foot and a half high, has spreading branches and somewhat scant foliage. Oil of pennyroyal, obtained from the leaves, is used medicinally as a stimulant. It is also useful in driving away mosquitoes, the odor being very objectionable to them.

PENOBSCOT, *pe nob'skaht*, the largest river in Maine, rising in a small lake near the Canadian boundary, flowing southeastward, then south and emptying into Penobscot Bay. Its total course is about 350 miles; it is navigable for large ships to Bangor, sixty miles from its mouth, but small craft ascend the stream far into an extensive lumber region. Great supplies of timber cut on its banks are floated down the river to sawmills. Large quantities of ice are harvested in winter.

PENSACO'LA, Fla., the third city in the state in size and the county seat of Escambia County, is forty-eight miles east of Mobile, Ala., on the Pensacola Bay, six miles from the Gulf of Mexico, and on the Louisville & Nashville, the Gulf, Florida & Alabama and the Pensacola, Alabama & Tennessee railroads. It has an excellent harbor, with the obsolete forts Pickens, Barrancas and McRee at the entrance. There is a large trade in lumber, fish, naval stores, cotton and coal. A United States navy yard is located here, and during the World War there was shipbuilding to a greater extent than formerly. The city has public parks of considerable beauty, and the remains of the old Spanish forts, San Bernardo and San Miguel, are also of interest. The important buildings are the state armory, the Federal building, the courthouse, the board of health laboratory, a great hotel and several large business blocks.

Pensacola was first permanently settled by the Spaniards in 1696. It was captured by the French in 1719, but was restored to the Spaniards four years later. The British took possession in 1763, but the place was captured by the Spaniards in 1781. General Jackson occupied the city during the War of 1812. The United States secured permanent possession in 1821, in accordance with the treaty of 1819, and the navy yard was soon after established. Population, 1910, 22,982; in 1917, 26,802 (Federal estimate).

PENSION, *pen'shun*, a regular allowance paid to a person at specified times. The term refers to a variety of such allowances—the stipend paid to retired employes of corporations, allotments granted by local governments to dependent widows, payments granted by national authorities to people too old to work, allowances to retired civil service employes, regular payments to soldiers and sailors and their relatives. The principle of civil service and old age pensions is securely established in Europe and in the British colonies.

Pensions in the United States. The national government has been very generous in granting pensions to its soldiers and sailors, but it has done nothing along this line for its civil servants except to grant retiring pensions to Federal judges and to officers of the army and navy. Widows of ex-Presidents are usually granted pensions by special acts of Congress, but this practice is based on precedent and not on law. On the other hand, many private corporations have regular pension funds for employes retired on

account of age, and school teachers in large cities often contribute a certain proportion of their salaries to create a permanent fund for retiring teachers.

Military Pensions. Plans for pensioning those who were injured in wars with the Indians and for assisting the families of those who lost their lives in these wars were adopted by the colonies before the Revolutionary War. Troops of the Revolutionary army were promised liberal pensions, and officers who remained in the service until the end of the war were promised half pay for life; but the Continental Congress was unable to redeem these promises.

After the formation of the Federal government, a general pension law was passed in 1792. In 1816 this law was revised, and the rate of pensions was raised from $5 to $8 per month, and the application of the law was extended to those who had been in the army and navy during the War of 1812. In 1818 the application of this law was made to include all survivors of the Revolutionary army or navy who had served nine months at any time during the struggle and were in needy circumstances. The law was so loosely worded that it led to many abuses, which were checked by a new law in 1820. Later, a number of laws were passed favoring the widows of Revolutionary soldiers and of the soldiers of the War of 1812.

The first pension act for soldiers of the Civil War was passed July 14, 1862. This and several of the laws that followed were what are known as *invalid pension* acts; that is, they applied only to those who were wholly or partially disabled by wounds or disease during the war. Pensions were also granted widows and children under sixteen of those who died from wounds or disease; in the event of no widows or children surviving, the pension went to dependent parents or minor brothers and sisters of those who died. The pensions were graded according to the degree of disability or dependence and ranged from $24 per year upward. Through a succession of laws the pension system has come to be applied to survivors of the Civil War whether disabled or not, and to the widows of pensioners. Veterans of the Spanish-American War and the Philippine insurrection are also included.

In 1912 an act was passed providing that any person sixty-two years old who had served for ninety days in the army or navy, and had received an honorable discharge, was entitled to receive a monthly pension of $13 a month. The allowances for those who had served more than ninety days ranged from $13.50 to $16, according to length of service. The allowances were also increased according to age of recipients, a maximum of $30 being awarded men reaching the age of seventy-five who had served three years. In 1918 a new schedule was authorized by act of Congress. The minimum allowance was placed at $30 a month, and the maximum at $40.

The World War. When America entered the World War it was decided to substitute an insurance system for the old method of providing for soldiers and sailors. This system is described fully in the article INSURANCE.

Bureau of Pensions. All matters pertaining to pensions are cared for in the Bureau of Pensions, which is a division of Department of the Interior. The Bureau is under the direct supervision of the Commissioner of Pensions.

Statistics. On June 30, 1918, there were 646,895 pensioners on the United States pension roll. Of these, 298,808 were Civil War soldiers, and 288,815 Civil War widows. On the same date there were 27,513 Spanish-American War pensioners. The total amount expended for allowances and incidental expenses from 1866 to 1918 was $5,433,381,191.45.

Related Articles. Consult the following titles for additional information:
Employer's Liability Old Age Pensions
Mothers' Pensions

PENTATEUCH, *pen'ta tuke,* meaning *five books,* the name given to the first five books of the Old Testament, which are *Genesis, Exodus, Leviticus, Numbers,* and *Deuteronomy.* The Jews designated them as the Books of the Law. Some authorities include a sixth book, *Joshua,* and call the whole the *Hexateuch.* Most Biblical scholars credit the books of the Pentateuch to Moses; others believe that portions of them were written after the death of Moses.

PENTECOST, *pen'te kawst,* the Greek name of a Hebrew festival, called by the Jews the Feast of Weeks. It was observed on the fiftieth day after the Passover and celebrated the ingathering of the harvest. In later times observance of Pentecost took the form of pilgrimages to Jerusalem. It was on this day that the Holy Ghost descended

on the Apostles, and thus Pentecost passed over into the Christian Church and became one of the great Church festivals of the year.

PE'NUMBRA, the partial shadow cast during an eclipse, the *umbra* being the total shadow. An observer in the umbra sees a total eclipse; one in the penumbra only a partial eclipse, and the nearer the edge of the penumbra the observer is, the less of the eclipse will he see. An observer outside the penumbra sees the luminous body without eclipse. See ECLIPSE.

PE'ONAGE, a system of enforced labor which has been common in the Spanish colonies of America, particularly in Mexico. *Peon* is a Spanish word meaning *day laborer*. It was originally applied to Indians. The Spanish government exempted Indians from military service and the payment of taxes and tithes, and also excluded them from such political and social privileges as to place them at the mercy of the governors of the colonies, and they used their authority to impose a system of labor upon the Indians that was practically slavery, since they were classed as criminals and compelled to work to pay fines or debts. As soon as a laborer had worked out his sentence, he might be rearrested on some other charge and compelled to continue his labor.

While the system was legally abolished long ago, the term *peon* is still applied to laborers of Indian or mixed blood, in localities, where because of ignorance they suffer the old abuses.

PE'ONY, a plant belonging to the buttercup family. It is a native of Europe and Asia and is very generally cultivated in gardens for the sake of the large, fragrant showy flowers, which are solitary and of a variety of colors, crimson, purplish, pink, yellow and white. The tree peonies of California and Japan produce white or rose-colored blossoms which are borne on a stalk three or four feet high. The plant is propagated from cuttings which are potted and kept in a greenhouse or cold frame. It may also be grown from seeds.

PEOPLE'S PARTY. See POPULIST PARTY.

PEO'RIA, ILL., the third city in the state in size, the county seat of Peoria County, 160 miles southwest of Chicago, on the Illinois River and on seventeen railroads, among the leading ones being the Chicago, Burlington & Quincy, the Illinois Central, the Chicago & North Western, the Chicago, Rock Island & Pacific, the Chicago, Peoria & Saint Louis, the Cleveland, Cincinnati, Chicago & Saint Louis and the Toledo, Peoria & Western. The city is built along the river at the outlet of the expanse known as Peoria Lake. The business section lies near the water, while the residences are chiefly on the bluff. The educational institutions include the Bradley Polytechnic Institute, Spalding Institute and Sacred Heart Academy. The city has a large public library, and law and high school libraries. Some of the charitable institutions are the Saint Francis Hospital, the Saint Joseph Home for the Aged, the House of the Good Shepherd and an orphanage. Other important buildings are the courthouse, the city hall, the Federal building, a cathedral, the Y. M. C. A. and the Coliseum, which seats about 6,000 people.

As an industrial center, the place is very important. It contains large agricultural implement works, including tractors, also glucose works and a large variety of other establishments, including foundries, machine shops, printing houses, strawboard works, packing houses, wire and steel works, flour and lumber mills, wagon works and other factories. There is also a large trade in grain and live stock. Peoria manufactured the first "tanks" seen on the European battlefront in the World War.

The place where Peoria now stands was visited by La Salle about 1680, and Fort Crevecoeur was then erected. The French settled here about 1778, but they were suspected of inciting the Indians against the Americans and were driven away by the United States soldiers about 1812. Seven years later the first permanent settlement was made, and this was incorporated as a town in 1835 and was chartered as a city ten years later. Population, 1910, 66,950; in 1917, 72,184 (Federal estimate).

PEP'IN, or **PIP'PIN**, the name of several prominent government officials in medieval France who bore the title *mayor of the palance*. PEPIN THE ELDER (died 639) was virtual ruler of the country during the reign of Dagobert I. His grandson, PEPIN OF HERISTAL, who died in 714, was major-domo at the court of Dagobert II. After the death of the king he was appointed duke of the Franks. Under a feeble regency he ruled the kingdom with almost despotic sway. Charles Martel was his natural son. PIPPIN

THE SHORT (714-768), son of Charles Martel, was, by agreement with the Pope, proclaimed king of the Franks in 752, after the deposition of Childerich. He invaded Italy twice, overthrew the Lombards and gave their lands to the Pope, thus laying the foundation for the temporal sovereignty of the Popes which was exercised until the last quarter of the nineteenth century.

PEP'PER, a genus of plants which furnish the black pepper of commerce. It is a native of the East Indies, and other tropical

PEPPER

regions where it is cultivated on an extensive scale. It is a climbing plant which yields two crops annually for about twelve years, has large, broad leaves, very small flowers and little globular berries, which, when ripe, are of a bright red color. The *black pepper* consists of the dried berries. The berries are gathered when they begin to change color, and are cleaned and dried in the sun or over a slow fire; in the process of drying the berries turn black. *White pepper* is the seed freed from the external skin and fleshy part of the fruit. *Red pepper* is obtained from the pods of the capsicum (see CAPSICUM). The larger fruited peppers, green or ripe, are used for pickling, sauces, etc.

PEP'PERMINT, a perennial herb, cultivated extensively for the pungent oil obtained by distillation from the leaves. It is easily distinguished from other kinds of mint by the leafy stalks and by the spikelike heads into which the flowers are grouped. The oil of the plant has a sharp, pleasant odor and taste, and is used medicinally and for flavoring. Michigan produces nearly one-half of the world's supply of peppermint oil, Saint Joseph county being the center of the industry.

PEP'SIN, a ferment found in the gastric juices which changes proteids into peptones (see PEPTONES). It acts best in a weak acid, whereas ptyalin, or the ferment in saliva, acts best in a weak alkaline solution. Preparations of pepsin are employed in medicine to aid digestion. The pepsin for these preparations is obtained from the stomachs of calves and pigs. That from the pig is preferred.

PEP'TONES, substances formed by the action of the ferment *pepsin* of the gastric juice and the ferment *trypsin* of the pancreatic juice during the process of digestion of such foods as lean meat, beans and white of eggs. These are generally known as *proteid* foods. Peptones are soluble, and they pass through the membranes of the intestines and are absorbed in the alimentary canal. However, before their absorption they are changed into tissue-building compounds, which are taken up by the blood and the lymphatics. Certain predigested foods known as beef peptones, milk peptones, etc., are designed for use by dyspeptics. See PEPSIN; PROTEIDS.

PEPYS, *peps, peeps,* or *pep'is,* SAMUEL (1633-1703), a famous English writer, whose *Diary* gives a detailed and valuable account of court life in England during the years from 1660 to 1668. It was written in a very abbreviated form and was deciphered and published in 1825. It has gone through numerous editions and remains very popular, being written in a fresh, breezy style and containing a great store of valuable and amusing anecdote.

PE'QUOT, a warlike tribe of New England Indians, which was practically exterminated in a bloody war with the white settlers in 1637.

PERCENT'AGE. In an examination Charles answers correctly five questions out of ten, while Mary answers thirty-five out of fifty. Mary has done better than Charles, but how are we to know exactly how much

better? We see that Charles has answered 5/10 of his questions, and Mary 35/50, but we require a single term to show their relative degree of merit.

John lost 30 cents out of a dollar he owned and William spent 40 cents out of a dollar he had earned. How shall we find a number which will show what part of a dollar John had more than William?

The two problems above given are like thousands of others, with slight variations, and it is clear that some system of calculation must be found by which they may easily be solved.

In the first problem, let us reduce our fractions to those having the common denominator 100. Then Charles has answered 50/100 of his questions and Mary 70/100 of hers. Mary is a better student by 20/100 than Charles. We have learned to express 20/100 decimally as .20, which is a simpler form than the fraction.

In the second problem, we begin its solution by remembering that a dollar contains 100 cents. John lost 30/100 of his money; William spent 40/100 of his; therefore, John has yet 70/100 of his original amount, and William 60/100 of his. John has 10/100 more money than William, which proportion we express decimally as .10.

These problems are solved on the basis of 100 for the complete amount in each case. We consider in the first instance the questions asked Charles and Mary on the basis of 100, and in the second place we know that the dollar is easily reckoned on its basis of 100 parts, or 100 pennies, comprising the whole. So we may build a section of our arithmetic which shall have for its foundation computations based on 100 parts to make the whole, or the entire thing, and we call this system *Percentage,* from two Latin words, *per* and *centum,* which together mean *by the hundred.* Instead of saying that a certain number is so many hundredths of one hundred, we say that it is so many *per cent.* In writing, we shorten the words *per cent* to the sign %.

The percentage system would not be of much use to us if by its means we could compare numbers only directly with one hundred. It would be easy enough to tell how many one-hundredths of one dollar a quarter is, but it would not help us in telling how many one-hundredths an inch is of a foot, or a quart is of a peck. However, if we remember the simple rule that any common fraction may be expressed as a per cent merely by reducing it to hundredths, we will find that the application of percentage is extended over a great part of arithmetic. Thus:

1/2 =50/100=50%
1/4 =25/100=25%
1/5 =20/100=20%
3/5 =60/100=60%
3/50= 6/100= 6%

There are a number of fractional parts of one hundred which are expressed as per cents so often that the per cents should be committed to memory.

1/2 =50 %	2/3=66⅔%
1/3 =33⅓%	3/4=75 %
1/4 =25 %	2/5=40 %
1/5 =20 %	3/5=60 %
1/6 =16⅔%	3/8=37½%
1/8 =12½%	5/8=62½%
1/10=10 %	7/8=87½%

If we examine the very simplest statement in percentage, 25% of $24=$6, we see that there are three numbers used—the number of which the per cent is taken, the number which tells how many hundredths are taken, and the number which results from taking the indicated number of hundredths of the given amount. The first of these is called the *base;* the second the *rate,* and the third the *percentage.* Thus in the statement above, 25% of $24=$6, $24 is the base, 25% the rate and $6 the percentage.

The sum of the base and the percentage is called the *amount;* the difference between them the *difference.*

The Three Cases. No problem in percentage can be worked unless two of the three numbers named above are given. These two may be either the base and the rate, the problem being to find the percentage; the rate and the percentage, the problem being to find the base; or the base and the percentage, the problem being to find the rate. The first one is the simplest, and the one most often met with.

Exercises under Case I. Given the base and the rate to find the percentage. Let it be remembered that the base represents the whole of anything. In the problem, What is 8% of 500?, 500 is the base, as it represents the whole, and we are required to find 8/100 of this whole. By the analytical method we may more clearly understand the process of the solution:

100%, or the whole, =500
1%= 5
8%= 40

The arithmetics tell us that if we have given the base and rate and are required to find the percentage, we multiply the base by the rate, decimally expressed. Let us see why this is correct. In the above problem we have to find 8% of 500. This means that we are to find 8/100 of 500. Expressed in fractional form, our problem resolves itself to this:

$8/100 \times 500$

8/100 may be expressed decimally as .08. Then we see clearly that the arithmetical process of solution is as follows:

$$\begin{array}{r} 500 \\ .08 \\ \hline 40.00 \end{array}$$

It will be evident from the above example that the rule which applies in percentage problems of Case I is, *Multiply the base by the rate.*

Solve the following examples, the first ten orally, the others with paper and pencil.

What is—

1. 5% of 200?
2. 50% of 12 oranges?
3. 25% of 400 yards?
4. 37½% of 64 bushels?
5. 7% of 80 cows?
6. 33⅓% of $750?
7. 62½% of 240 acres?
8. 8⅓% of 96 apples?
9. 20% of 1200 Sheep?
10. 6% of 90 feet?
11. John has 64 marbles; James has 37½% as many. How many has James?
12. Mary earned $2.40; she spent 10% for ribbons, 6% for candy, and 4% for pencils. How much did she spend?
13. A flagstaff is 72 feet high. How high is a flagstaff that is 75% as high? One 25% as high?
14. A man owned 1,000 acres of land and sold 62½% of it. How much did he have left?
15. Mr. A paid $450 for dry goods. He sold them at a gain of 27%. How much did he gain?

Exercises under Case II. This is the case in which the rate and percentage are given and the base is to be found. In the problem discussed first under Case I we were asked to find 8% of 500. We found it by two different forms of solution to be 40. 40 is a certain part of 500, for it is the same as 8% of 500. Then is it not clear that the percentage, 40, and the rate, 8, exactly equal each other? Let us apply that truth to problems under Case II, in which the rate and the percentage are given and in which we are to find the base. Remember that the base is still 100%, or the whole:

25 is 20% of what number?

We are to find 100% and we know that 20% of it is 25. Let us solve this problem by the analytical method:

20% of some number	=25.
1% of that number	=1¼.
100%, or the whole number,	=125.

All problems of this class, no matter how complicated they may at first appear, may be solved by this analytical form. The usual method used in the arithmetics follows this rule: *Divide the percentage by the rate, expressed decimally.*

Solve the following problems, as many of them by the analytical and fractional methods as possible, the others by the usual arithmetical rule. By the fractional method the first problem below is easily solved. 20% is 1/5 of the whole. Then if 18 is 1/5 of the whole, 5/5 of the whole would be 5×18, or 90.

Find the number of which—

1. 18 is 20%.
2. 230 is 75%.
3. 24 is 8⅓%.
4. 81 is 9%.
5. 770 is 11%.
6. 18 is 90%.
7. 345 is 12½%
8. 276 is 40%.
9. 375 is 62½%.
10. 421 is 16⅔%.
11. An agent was to receive a commission of 4% for purchasing goods for a merchant; his commission amounted to $36. How many dollars' worth of goods did he buy?
12. In selling a store at an advance of 10%, Mr. B made $400. How much did the store cost him?
13. John had a certain sum of money in the morning. He found at night that he had lost $.51, or 17% of it. How much did he have in the morning?
14. Mr. Brown lost $30 by selling a quantity of apples at 6% below cost price. How much had the apples cost him?
15. In selling a house for $5,625, Mr. Gray made 12½ per cent. Find the original cost of the house.

This problem differs from any that we have had before, $5,625, the sum for which the house was sold, is the base plus the percentage—that is, the amount. To find the base, divide this amount by, 1 + the rate—1.12½.

Exercises under Case III. This is the case in which the base and the percentage are given and the rate per cent is to be found. Keep in mind the fact that the base is always 100%, and that the percentage is such a part of the base as is indicated by the rate per cent. Let us analyze the following problem:

10 is what per cent of 30?

30 is the entire amount or the entire number, and is 100%. 10 is a certain part of 30 and we are required to find that part. 30 equals 100%. If 30 equals 100%, 1 equals 1/30 of 100%, or $3\frac{1}{3}$%. If 1 equals $3\frac{1}{3}$%, 10 would equal $10 \times 3\frac{1}{3}$%, or $33\frac{1}{3}$%.

There is another simple way of solving this problem. 10 is $\frac{1}{3}$ of 30, and if the whole number is 100%, then $\frac{1}{3}$ of 100%, or $33\frac{1}{3}$%, will represent the relation between 10 and 30.

From this we may make the general rule: *To find the rate divide the percentage by the base.*

Solve the following problems:

What per cent of—

1. 60 is 20?
2. 90 is 30?
3. 96 is 8?
4. 216 is 36?
5. 72 is 6?
6. A lawyer collected $466 for a firm, and received for his services $23.30. At what rate was he paid for making the collection?
7. Mr. Brown bought a house for $6,000 and sold it for $7,000. What was his gain per cent?
8. C paid $150 for apples and sold them for $165. What per cent did he gain?
9. B bought two horses, for $150 and $200 respectively. He sold them for $175 each. What per cent did he gain or lose on the two?
10. A storekeeper buys pencils at 8 cents a dozen and sells them at 2 cents apiece. What per cent does he gain?
11. An agent received $80 for buying $2,000 worth of goods for a merchant. What was the rate per cent at which he was paid?
12. If by selling a picture for $231 I gain 10%, what per cent would I gain by selling it for $241.50?

The applications of the principles of percentage in practical arithmetic are numerous. Commission, Trade Discount, Taxes, Insurance, Stocks and Bonds—all of these subjects have as their basis the simple principles of percentage which have been discussed. To sum up, there is no more vital element in arithmetic, and later in the business world, after pupils have mastered the fundamentals of addition, subtraction, multiplication, division and fractions, than percentage. Indeed, in many applications percentage supplants to a large extent the use of fractions; while one thinks in terms of fractions he translates into percentage forms, and *vice versa.* In school the teacher must direct the youthful mind to understand this intimate relation; in the home the same care should be exercised.

PERCEPTION, *per sep'shun,* the mental power by which we interpret impressions received through the senses. Sensations grow into perceptions, and the relation between sensation and perception is so close that we cannot find a clear line of separation between them. Perception is a complex act, including sensation and all the other mental powers. When one becomes conscious of a sensation, he immediately gives his attention to it. This involves an act of will. The idea received is then compared with other ideas in the mind, calling into play memory, which brings these ideas into consciousness, the thought power, used in the process of comparison, and the judgment, used in deciding whether the new idea agrees or disagrees with the old. As ideas are apprehended, they are compared with the ideas in the mind and classified.

Cultivation of Perception. The power of perception is one of the earliest powers developed and is synonymous with the power of observation. The child can be greatly assisted in developing this power, if parents and teachers will adhere to a few simple principles. These are:

(1) The cultivation of perception is coincident with training of the senses. This training should receive careful attention during childhood and youth, the periods, in which these powers are the most active.

(2) Attention is essential to perception, and attention depends upon interest. If the child is brought in contact with his surroundings in such a manner as to have them appeal to his curiosity, he readily gives attention to those things that interest him and gains ideas for himself.

(3) Only a very small part of a sensation is perceived at one time; hence, complete perception requires frequent repetition.

(4) Complex ideas are perceived gradually, only a part of the idea being retained with each impression. As the proper relations become established, the idea develops in the mind and finally assumes its true relation. To attempt to force this development or to expect the immediate perception of complex ideas by children leads to memorizing facts which have no meaning, and dwarfs the reason.

(5) Clear ideas are obtained only by careful observation of simple things or acts. Too many objects, the attempt to grasp too many things at once, or the use, with young children, of objects which are complex, tends to the confusion of ideas.

(6) Illusions often arise from prepossesed ideas. One thinks he sees what he expects to see, as more than half of an orange, the back side of a cube, when impartial observation shows that this is impossible.

(7) Right preparation of the mind is a great aid to perception. The skilful teacher prepares her pupils to receive the new ideas which she is to present by carefully leading up to them in such a manner as to cause the pupils to anticipate what the new lesson contains.

(8) Observation means careful, systematic looking at things. While some possess this power to a greater extent than others, it is perfected only by training.

(9) The perceptive powers should be so trained as to make them first accurate, then quick. Pupils whose powers of observation have been thus trained during the first years of their school life will readily appreciate the beauties of nature, literature, music and art.

Related Articles. Consult the following titles for additional information:

Apperception	Interest
Attention	Psychology
Concept	Sensation

PERCH, *purch,* a large family of nearly 125 species of fresh-water fishes, found both in America and Europe. The best-known species is the *river,* or *yellow,* perch, common in the streams and lakes from New England and New York to the upper Mississippi Valley. The perch is a small fish, seldom exceeding a pound in weight, with elongated body and small, rough scales, and is easily caught by hook and line. Its flesh is highly esteemed, but the perch is not considered as valuable as numerous other species because of its large number of bones.

PERENNIALS, *per en'i als,* plants which live more than two years. They include two groups; the first comprises trees and shrubs, the second herbaceous plants such as the potato, which blooms and bears year after year. The word is sometimes applied to herbs only the roots of which are perennial, the parts above ground dying down in winter. As a rule, however, the term is used to designate such plants as shrubs, which live from year to year. Plants that live but a year are called *annuals;* those that live two years are *biennials.* Many plants, perennials in their native habitat, when taken to cold regions die in winter, becoming annuals.

PER'FUMES, treasured by femininity the world over since time immemorial, are substances prepared for personal use because of their pleasing odor. Perfumes of various sorts in the form of incense were used in religious ceremonials in the most ancient times. Perfumes are classified as *animal, vegetable* and *artificial.*

Animal Perfumes—Manufacture and Use. The animal odors are musk, civet, ambergris, castor and such vegetable perfumes as are obtained in the form of essential oils. These are of great value because of their permanence and penetrating power. In concentrated form they are very strong, and their preparation requires great skill. The original substances are soaked, or macerated, in alcohol to form tinctures, and are used in small quantities in the preparation of the perfumes.

Vegetable Perfumes—Manufacture and Use. There are many vegetable perfumes. The most delicate are extracted from the blossoms of odor-bearing plants. The most expensive perfume on the market at present is the oil of rose petals, or attar of roses. In making this perfume, the blossoms are taken from a bushy variety of the damask rose and from the white musk rose. The flowers are gathered in the latter part of May, and as soon as picked are taken to the distillery and placed in large, cool cellars. About twenty-five pounds of fragrant blossoms are put into a tinned copper still, water is added and a fire is started in the miniature furnace underneath. When about one-fifth of the contents has been drawn over through a water-cooled worm, the still is emptied and recharged, and the process is repeated until all the harvest of roses has been used. The first product is simply rose water. This rose water is returned to the still, and about one-third of its bulk of second rose water is drawn over. Throughout this liquid, there are scattered little globules of a precious, fragrant, oily attar. The distilled water is now put into bottles, and the oil gradually comes to the top and is dipped out with a spoon. This attar is worth about $50 to $100 an ounce.

Nearly all the ordinary perfumes are made by a process known as *enfleurage.* This consists in placing freshly gathered flowers in a glass case, the lid of which has been daubed with lard to the depth of half an inch. In the course of a day the lard absorbs all the essential oils in the flowers, and they are replaced by fresh ones. When fully charged, the lard is scraped off, melted and combined with alcohol, which brings the volatile oil to the surface. It is then skimmed off and filtered and is ready to be bottled and shipped. The waste leaves from the process are used as fertilizers.

Artificial Perfumes. The manufacture of artificial perfumes has developed into an in-

dustry of great importance. The perfumes of commerce consist of various combinations of the animal, vegetable and artificial perfumes dissolved in alcohol and water.

The manufacture of perfumes is now chiefly carried on in Paris and London and in various towns near the Mediterranean, especially in the south of France. Districts are famous for certain productions. Cannes is noted for its perfumes of the rose, tuberose, orange blossoms, cassia and jasmine; Nimes, for thyme, rosemary, and lavender; Nice, for the violet and mignonette. England claims superiority for its lavender, which is cultivated upon a large scale in Surrey. Turkey and Bulgaria are noted for their attar of roses.

PERICAR'DIUM, the conical sac which encloses the heart and a small part of the large blood vessels. It consists of two membranes, an outer fibrous membrane and an inner serous membrane which completely envelops the heart and secretes a fluid that lubricates it. The outer membrane is formed of closely interlacing fibers, which at the upper end interweave with the fibers of the outer coats of the large blood vessels, forming a closed sac. At its broad lower end the pericardium is attached to the upper surface of the diaphragm. In rheumatic fever the pericardium is likely to become inflamed.

PERICLES, *per'i kleze* (495–429 B. C.), the most celebrated statesman of ancient Greece. Born of a prominent family, naturally endowed with intellect and good looks, and educated by the foremost scholars of his day, he had little difficulty in attaining to political leadership. At the time he entered on his public career Athens was on the threshhold of a new day. Although power was in the hands of the aristocracy, the germs of democracy were in the minds of the people. Pericles announced himself at once a friend of the people. When Cimon, the leader of the aristocracy, died, Pericles became virtual ruler of Athens (449 B. C.), wrought a complete change in its administration and thoroughly democratized it.

Before he came into power only members of the aristocratic class were eligible for the higher offices of government; Pericles made citizenship the sole requisite for such offices. He transferred the power of the Areopagus, till then the leading court of Athens, to the Senate, the popular assembly. He instituted the custom of paying salaries to public officials. Because he believed in the educational value of the theater, he made attendance possible for all who could not pay for admission. Ambitious to make Athens the most glorious city of Greece, he began to embellish it with beautiful public buildings and with sculpture. The temple of Athena Nike, the Propylaea and the Parthenon, the crowning achievement of Greek architecture, were built under his guidance. All artistic activity received a powerful stimulus; sculpture and philosophy flourished; a period of unprecedented prosperity set in, and Athens experienced the most brilliant period in its history.

It was Pericles' ambition not only to make Athens the chief center of Greek culture and prosperity, but also to extend its power over the other Greek states; ultimately he hoped to form a confederacy under the leadership of Athens. To this end he reduced Naupactus and Aegina, subdued Samos and won back Euboea. The wealth and expansion of Athens aroused the jealousy and fear of the Peloponnesians, and the Peloponnesian War was the result. While in the throes of this disastrous conflict, Athens was attacked, in 430 B. C., by a terrible plague, and hundreds died. Crazed by superstition and despair, the people blamed Pericles for their condition and deposed him. But there was no one to take his place, and he was recalled. Soon afterwards, however, in 429 B. C., he himself fell a victim to the disease and died. The death of Pericles closed the greatest period in Greek history, for there was no one to succeed him, and Athens steadily declined.

PERIGEE, *per'i je*, an astronomical term, derived from the Greek words meaning *near* and *earth*, and used to designate that part of the orbit of the moon which is nearest the earth. When the moon, in its irregular revolution about the earth, comes closest to that planet it is said to be *in perigee*.

PERIPATET'IC SCHOOL OF PHILOSOPHY, the system of philosophy of Aristotle and his followers, so called, it is believed, because he was accustomed to walk up and down with his more intimate disciples, while he expounded to them his doctrines. Practical philosophy is divided by Aristotle into ethics, economics and politics. According to his ethical system, the highest good is happiness, which depends on the rational or virtuous activity of the soul throughout life. Virtue is proficiency in willing what is conformed to reason. All virtues are either

ethical or intellectual. The former include justice, or righteousness, generosity, temperance and bravery, the first being the highest. The intellectual virtues are reason, science, art and practical intelligence. For the attainment of the practical ends of life, it is necessary for a man to live in society and form a State.

The Peripatetic School continued at Athens uninterruptedly till the time of Augustus. Those who proceeded from it during the first two or three centuries after Aristotle's death abandoned, for the most part, the metaphysical side of his teaching and developed chiefly his ethical doctrines or devoted themselves to the study of natural history. No other one of the philosophical schools of antiquity maintained its influence so long as the Peripatetic. See ARISTOTLE; PHILOSOPHY.

PERITONEUM. See ABDOMEN.

PERITONI'TIS, inflammation of the serous membrane lining the abdominal cavity. Chills, severe pain in the abdomen, difficult and painful breathing, and vomiting are the common symptoms of acute peritonitis. Sometimes the attack may be checked in the beginning by the use of ice bags and the administration of a purgative. The patient should rest quietly in bed until recovery is accomplished.

PERJURY, *per'ju ri,* in law, the offense of deliberately giving false testimony in a judicial proceeding after having sworn to tell the truth. If a witness unintentionally makes a statement contrary to fact he is not held guilty of perjury; but if he knowingly swears to a lie upon an issue under trial he is subject to the punishment which the law attaches to the offense. To incite or force another to commit perjury is called *subornation of perjury.* Technically, perjury is generally treated as a *misdemeanor,* and is punishable as such; in some jurisdictions it is classified as felony. In the United States, Canada and England perjury is punished with fine or imprisonment, or both. See FELONY; MISDEMEANOR.

PERKINS, GEORGE WALBRIDGE (1860–), an American financier and political leader, was born in Chicago and educated in the public schools of that city. At an early age he became connected with the New York Life Insurance Company, and his advancement in the company was rapid. In 1891 he became third vice-president, and in 1903 first vice-president. In 1903 Mr. Perkins became a partner in the firm of J. P. Morgan & Company; later he was made chairman and director of the International Harvester Company, and a director of the United States Steel Corporation. He is widely known for his ability to handle large transactions, and he has interests in many of the largest corporations of the country.

Mr. Perkins has always taken an active interest in politics. In 1912 he was made chairman of the executive committee of the Progressive party, and he contributed liberally of his services and means to secure the success of that party in the national election. He took part in the great movements for financing the United States government and the governments of Great Britain, France and Russia after the outbreak of the World War.

PERMIAN, *per'mi an,* **PERIOD,** a division of geologic time, the last of the Paleozoic Era. It followed the Carboniferous Period and preceded the Triassic. In this period there were tremendous geographic changes over the face of the earth, gigantic upheavals of the sea bottom which resulted in new land areas. India, Africa and Australia were largely covered with ice. The rocks of the period are chiefly sandstone and shale. These contain few fossils. The plants consisted of ferns and cone-bearing trees, the latter the precursors of the sequoia. Reptiles appeared in the course of the period and before the end of it outnumbered the amphibians. Imprinted upon the rocks are the impressions of gigantic lizard skeletons ten feet long. In South Africa, where animal life in this period was more highly developed than in other quarters, have been found among the Permian rocks indications of a missing link between the reptiles and mammals. See GEOLOGY.

PERNAMBUCO, *per nam boo'ko,* BRAZIL, capital of the state of Pernambuco, on the Atlantic coast. The name RECIFE is often applied to the city, and this is also the name now given to the oldest part of the city; other parts are called Sao Antonio, which is on an island, and Boa Vista, on the mainland. Recife is the principal seat of business; Sao Antonio has most of the public buildings, and Boa Vista is the fashionable residence quarter. The harbor of the city is protected by a reef, which encloses a belt of water about a mile in breadth. Many of the buildings of the city are worthy of note. The trade is extensive. The principal exports are

sugar, cotton, dyewoods, rum, alcohol and hides. The manufactures include cotton, machinery, glass and leather, but they are not yet of great importance. Penambuco is now the third largest city in Brazil and the second in point of commercial importance. It was founded by the Portuguese in the sixteenth century and from 1630 to 1654 was in the hands of the Dutch. Population, 1911, estimated, 150,000.

PEROXIDE OF HYDROGEN. See HYDROGEN DIOXIDE.

PERPETUAL MOTION, motion which never ceases. There have been many attempts to make a machine which will run continuously by the power it creates. The idea rests on a false notion, for energy cannot be created (see ENERGY). To illustrate, the water of a creek may be impounded and used to operate an electric dynamo whose current may be transformed into light, heat or power to operate other machinery; but the dynamo cannot create the power to operate itself.

PERRAULT, *peh ro'*, CHARLES (1628–1703), a French writer of fairy tales, to whom the world is indebted for modern versions of *Cinderella, Little Red Riding Hood, Puss in Boots, Sleeping Beauty* and many other fascinating tales. Perrault was born at Paris and educated at the College of Beauvais. He practiced law for a short time and afterwards devoted himself to literature. In 1697 he published his book of stories and called it "Mother Goose." These stories are old French folk tales which had a verbal existence for centuries before he collected and put them in literary form, having passed down from generation to generation by word of mouth among the French peasantry. They are among the choicest of fairy tales. A good adaptation for English readers has been made by Andrew Lang and called *Popular Tales.*

PERRY, BLISS (1860–), an American editor and author, who since 1907 has occupied the chair of belles-lettres (English literature) at Harvard University. He was born at Williamstown, Mass., and educated at Williams College and in the universities of Berlin and Strassburg. In 1881 he became an instructor in Williams College, and in 1886 was appointed professor of English in that institution. In 1893 he was called to a similar position in Princeton University, where he remained until 1899, when he became editor of the *Atlantic Monthly,* holding the position for ten years. The chair in Harvard to which he was chosen in 1907 was formerly occupied by Longfellow and Lowell. In 1909–1910 he represented Harvard as special lecturer at the University of Paris.

Professor Perry is regarded as one of the foremost literary scholars and writers in America, and is widely known as editor of the Cambridge edition of the poets and as editor of *Little Masterpieces.* He has written many essays and magazine articles pertaining to his chosen field of labor, and is the author of *Salem Kittredge, and Other Stories; The Powers at Play; A Study of Prose Fiction; Walt Whitman; Whitter; The American Mind;* and *Thomas Carlyle: How to Know Him.*

PERRY, MATTHEW CALBRAITH (1794–1858), an American naval officer, brother of Oliver H. Perry. In 1852 he accomplished his most notable service, in command of an expedition to Japan, where he succeeded in negotiating the treaty by which that country entered into commercial relations with other nations. Perry was the first American to circumnavigate the globe.

MATTHEW C. PERRY

He was born at Newport, R. I., entered the navy at the age of fifteen and served during the War of 1812. After engaging for a time in mercantile service, he reëntered the navy and was given command of unimportant expeditions against West Indian pirates. He was promoted to the rank of commander in 1826 and, in charge of the Brooklyn Navy Yard, superintended the construction of the *Fulton,* the first steam vessel in the United States navy. He was placed in command of the vessel when it was completed and in 1841 was made commodore and was assigned to command of the fleet for the suppression of the African slave trade. He commanded for a time the American fleet in the Mexican War.

PERRY, OLIVER HAZARD (1785–1819), an American naval officer, born at South Kingston, R. I. He is famous chiefly for his defeat of a British force on Lake Erie in 1813. Perry, who had nine vessels, with fifty-four guns and four hundred ninety officers and

men, fought six vessels, with sixty-three guns and about four hundred sixty officers and men. He lost four-fifths of the crew of his flagship, but finally won a complete victory which he announced in the brief dispatch, "We have met the enemy and they are ours—two ships, two brigs, one schooner and one sloop." Perry was rewarded with a gold medal and the rank of captain. He died of yellow fever in Trinidad and was buried there, but some years later his body was carried to Newport, R. I., where there is a bronze statute of him.

OLIVER HAZARD PERRY

PER'RYVILLE, Battle of, a battle fought at Perryville, Ky., October 8, 1862, between a Federal force of 22,000, under General Buell and a Confederate force of 17,000, under General Bragg. The Confederates opened the battle with an attack upon the left wing of the Federal army, under McCook, and were at first successful, but were finally driven back. They retired during the night. Though in many respects a drawn battle, this engagement was practically a victory for the Federals. The Confederate loss was about 3,500, while the Federal loss was about 4,200.

PERSEPHONE, *per sef'o ne.* See Proserpina.

PERSEP'OLIS, the ancient capital of Persia, and a magnificent city in the time of Darius I. It was situated in a fertile valley about thirty miles northeast of the modern city of Shiraz. In 331 B. C. it was conquered by Alexander the Great, and by him partly demolished. Later another city was built on its ruins, but this also was destroyed. The remains of huge marble columns, massive walls and sculptures are evidence of the magnificence of the early city.

PERSEUS, *pur'se us,* an ancient Greek hero, son of Jupiter and Danae. When he was sent by Polydectes, king of the island of Seriphos, on a quest to kill the Gorgon Medusa, he was aided by Mercury, who loaned him his winged sandals; by Minerva, who furnished him with her magic shield; and by Pluto, who supplied a helmet which made him invisible. So safeguarded, Perseus flew to a land of perpetual darkness, the home of the Graeae, three sisters who had among them one tooth and one eye, and who alone possessed the secret of the dwelling place of Medusa. Perseus succeeded in securing their single eye, which he returned to them upon receiving the information he sought. He flew to Medusa's home and cut off her head, and holding it far above his sight, he flew away with it. From the drops of blood which dripped into the ocean, Neptune fashioned his steed Pegasus.

After various adventures, chief of which were the rescue of Andromeda from a sea monster and the transformation of Atlas into a mountain, by showing him the Gorgon's head, Perseus arrived in Seriphos. Finding that his mother had been persecuted by Polydectes, he revenged himself by showing the king the Gorgon's head, which turned him to stone. With his mother and his wife, Andromeda, he then returned to Argos. One day, while engaged in a game of quoits, he accidentally killed his grandfather Acrisius, king of Argos, thus fulfilling an early prophecy. Upon his death the gods placed Perseus as a constellation in the heavens.

PERSHING, *pur'shing,* John Joseph (1860–), an American military leader, commander in chief of the expeditionary forces of the United States during the World War, and the first American officer to command American soldiers on European soil. Pershing was born in Linn County, Missouri, and is a graduate of the Kirksville normal school in that state. In 1886, the year of his graduation at West Point, he entered the regular army as a second-lieutenant of cavalry, and saw active service in the wars with the Apaches and the Sioux. The outbreak of the Spanish-American War (1898) found him an instructor in tactics at West Point. He immediately offered his services to the government, had an active part in the Santiago campaign in Cuba, and after the conclusion of peace was sent to the Philippines, where he remained until 1903. While in the Philippines he was the organizer and first chief of the Bureau of Insular Affairs, and subsequently was appointed military governor of the islands. After an interval in which he served as military attaché at Tokyo, he was promoted to the rank of brigadier-general (1906) and later acted as governor of Moro province,

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GENERAL JOHN JOSEPH PERSHING

Commander United States Army in France in the World War.

P. I. In making him brigadier-general President Roosevelt promoted him over the heads of 862 officers.

Pershing was placed in command of the Eighth Brigade of the regular army on his return to the United States, in January, 1914, and he was temporarily stationed at El Paso, Tex., to guard the Mexican border. When the raid on Columbus, N. M. (1916) made stronger measures necessary, he led the punitive expedition into Mexico (see MEXICO, subhead *History*). In February, 1917, General Funston, who was Pershing's superior, died, and President Wilson nominated Pershing to succeed him. He remained in command of all the troops on the border until early summer, when he proceeded to France to assume command of the American forces.

After Pershing's arrival in Europe he was raised to the rank of general. He coöperated splendidly with the other allied officers, and showed himself a leader and organizer of first rank. He personally urged the attack on the Saint Mihiel salient, and carried out that attack with precision and vigor. This was the first American offensive on a large scale, and was a brilliant triumph both for the commanding officer and the men. General Pershing's report to the War Department, cabled on November 20, 1918, after Germany's surrender, is a document of dramatic interest.

Pershing's wife and three daughters perished in a fire which burned the Presidio in San Francisco August 27, 1915. A young son was saved.

Carpet weaver

PERSIA, *pur'sha*, or *pur'zha*, a decadent monarchy in Southwestern Asia, in ancient times the nucleus of a mighty empire that stretched from the Indus River to the Mediterranean Sea. Even to-day the figures representing its dimensions and area are somewhat impressive, but in respect to its influence in world affairs Persia is of minor importance. According to the most reliable estimates the country extends 700 miles from north to south and 900 miles from east to west, covering an area of 628,000 square miles. It touches Transcaucasia, the Caspian Sea and Russian Turkestan on the north, Turkestan, Baluchistan and Afghanistan on the east, the Persian Gulf and Indian Ocean on the south, and the Persian Gulf and Asiatic Turkey on the west. The population is estimated at 9,500,000; there are, on the average, about fifteen persons per square mile. The inhabitants call their country *Iran*.

In 1907 Great Britain and Russia entered into an agreement regarding "spheres of influence" in Persia. Each nation was to control the Persian provinces adjoining its possessions; that is, Russia was to be dominant over 305,000 square miles in Northern Persia, and Great Britain over 137,000 square miles in the southeast. The integrity and independence of the country were to be respected by the two powers, but they reserved the right to control its finances should occasion arise. In January, 1918, the Bolshevik government of Russia formally renounced the agreement, and on May 2, the same year, the Persian government declared it null and void.

The People. The Persians constitute the most important group of the Iranian branch of the Aryan race, and to-day they represent a mixture of Mongolian, Tartar, Arab and Turkish elements. The town and city dwellers and the settled agricultural population have developed a typical civilization along Oriental lines; in the mountainous districts there are nomadic tribes of herdsmen living under very primitive conditions. About nine-tenths of the people are Mohammedans of the Shiite sect, and there are besides about 850,000 Mohammedans of the Sunni sect, which is dominant in Turkey. Parsees, Jews, Armenians and Nestorians are also represented in the population.

Government and Education. In government Persia is an hereditary monarchy, the ruler of which bears the title of shah, or sultan. There is a Cabinet of eight Ministers. The country is divided into thirty-three provinces, administered by governor-generals appointed by the shah. The nomad tribes, however, are under the rule of their own chiefs. Europeans manage the postoffice and customs service, and the people are heavily taxed.

Persia has a national system of education, but the chief instruction given the masses consists in teaching them to read the *Koran*. Private tutors are employed by families of means. An educational council has been formed, and increasing attention is being given to the education of girls. In 1849 a

polytechnic school with several European instructors was established in Teheran, and it opened the way for the introduction of a knowledge of science and Western languages into Persia. Several colleges are maintained by public funds; these give courses in religion, Arabic and Persian literature and science. There are military colleges at Teheran and Tabriz and a French school is maintained at Teheran.

Surface and Drainage. Persia is an elevated plateau, broken by clusters of hills or chains of rocky mountains, which alternate with extensive plains and barren deserts. Low tracts occur along the Persian Gulf and the Caspian Sea. The interior plains have an elevation of from 2,000 to 6,000 feet above the sea. This vast central plateau is supported in the north and south by two great mountain systems, and from these all the minor ranges seem to spring. The northern chain, an extension of the Hindu Kush, enters Persia from Northern Afghanistan and reaches its greatest elevation south of the Caspian, where it takes the name Elburz Mountains and attains, in Mount Demavend, a height of about 18,500 feet. The other great mountain system runs from northwest to southeast nearer the Persian Gulf, is of considerable width and forms several separate ranges. The rivers are few and insignificant. None is of any navigable importance except the Karun, recently opened to the navigation of the world. There are a great number of small fresh-water lakes, and a few very extensive salt lakes, the largest being Urumiah, in the extreme northwest.

Climate. The climate varies considerably in different provinces, and in the central plateau intense summer heat alternates with extreme cold in winter. The shores of the Persian Gulf are scorched in summer; those of the Caspian Sea, especially the parts covered with dense forest, are humid and infested with malaria.

Mineral Resources. The mineral resources of Persia are rich but little developed. Iron, copper, lead and antimony are abundant, sulphur, naphtha and rock salt are found, and coal is worked near Tabriz. The turquoise mines of Nishapur are the only mines receiving anything like adequate attention.

Production and Industry. Only a small proportion of the arable land is under cultivation, and farm implements used are very simple. Nevertheless, wheat, barley and rice are raised in large quantities, as are peas, beans, lentils and millet. Enough cotton, of the short-staple variety, is produced for export. In the Caspian provinces silk is an important product, supplying Ispahan and other centers of silk manufacture. Tobacco of high quality is produced in sufficient quantities to supply a great home demand and maintain a considerable export trade. Of increasing importance are the opium industry and the production of tragacanth and other gums. Conditions favor an extensive cultivation of the opium plant, or poppy. Indigo, grown in the southwestern provinces, is a profitable source of dyestuff. Persia also produces a wide variety of fruits, including melons of superior quality and dates of excellent flavor.

The country produces horses of fine breed, camels, mules and sheep. Wool of a quality approaching that of Cashmere is used in home manufacture and exported. Of especially high grade is Persian lamb skin. There are no factories in the country in the modern sense of the term, but fancy articles and textile goods are made in large quantities in private shops, homes or trade schools. The most important manufacture is the famous Persian carpet, or rug. There are numerous varieties, all made by hand and each having an individual design. Woolen shawls made of goat's hair are also a profitable line of manufacture.

Communication and Commerce. In 1888 a railway six miles long was opened from Teheran to Shah Abdul-azim, a suburb. It is operated by a Belgian company. In March, 1916, a railway constructed by a Russian company was opened between Julfa, on the Russian frontier, and Tabriz. Steamship service on the Karun is subsidized by the British government. A few good carriage roads for the transference of mails and passengers have been constructed between the larger towns. The numerous caravan routes are usually mere mule paths. There is regular mail service between the principal cities, and a telegraph system consisting of 10,750 miles of wire is in operation.

Tabriz, Teheran, Hamadan and Ispahan are the chief trading centers. Interior trade is carried over the caravan routes, which, unfortunately, are subject to bandit raids. On the Caspian Sea and the Persian Gulf there are a number of ports visited by foreign vessels. Trade is carried on with China, Turkey,

India, most of the European countries and the United States, but previous to the Russian revolution Russia had the largest share. Persian exports to the United States consist largely of carpets.

History. From the most ancient times of which we have any record the Persians have inhabited the southwestern part of the plateau of Iran, anciently known as Persis. In the ninth century B. C. they were first conquered by the Assyrians and forced to pay tribute. In 660 B. C., when the Assyrians were overcome by the Medes, the allegiance of Persia was transferred to Media.

About 550 B. C. Cyrus the Great conquered the king of Media, and Persia became the mistress, instead of the vassal, of Media. From this time on, the Medes and Persians are spoken of as one people. Cyrus continued his conquests and built up an empire which extended from the Oxus and Indus to the Mediterranean. He was succeeded by his son, Cambyses II (529–522 B. C.), who subdued Tyre, Cyprus and Egypt. Darius I, who ascended the throne in 521 B. C., organized the kingdom and divided it into twenty states, each governed by a satrap, who was appointed by the king. The capital of the empire was fixed at Susa. The Grecian colonies in Asia Minor had fallen into the hands of Cyrus, and it was Darius's plan to subjugate the mother country. To this end he sent two great expeditions against the Greeks, but they were both fruitless, the second ending in his defeat at the famous Battle of Marathon (490 B. C.). Darius died in 486 B. C. and was succeeded by his son, Xerxes I, who carried on his father's plans against Greece. Assembling over a million soldiers, he marched at their head to the Hellespont. At the pass of Thermopylae his march was checked by the Spartan Leonidas, with 7,000 Greeks. Leonidas and all his men fell at the hands of the Persians, and Xerxes advanced successfully to the plains of Greece. Nothing but defeat awaited him there, and the battles of Salamis, Plataea and Mycale banished all hopes of Persian supremacy in Europe.

Persian history during the next century is a record of internal strife. The most noteworthy event was the attempt of Cyrus the Younger (401 B. C.) to seize the throne of his brother Artaxerxes. Finally, in 330 B. C., the empire fell before Alexander the Great. After his death, Persia passed successively into the hands of the Seleucidae, the Sassanians, the Arabs and the Seljuks. The dynasty of the Seljuks was swept away by the Mongols under Genghis Khan, in A. D. 1223. His grandson Hulagu Khan founded the Perso-Mongol dynasty, which, in 1380, gave way before Timur (Tamerlane) the Tartar. After Timur's death the Turkomans were masters of the country for about a hundred years.

In 1500 Ismail Safi, who pretended to be descended from Ali, the son-in-law of Mohammed, at the head of the force of Turkish tribes overthrew the Turkomans and made himself ruler of Persia, assuming the title of shah. Shah Ismail and his descendants were constantly obliged to protect Persia from the sultan of Turkey. In 1795 Agha Mohammed, a Turkoman, founded the present dynasty of Persian rulers. In 1797 Agha was succeeded by his nephew, Futteh Ali, who, soon after his accession, became involved in a war with Russia. By the Treaty of Gulistan (1813), Persia ceded several provinces to Russia and granted that country the right of navigation in the Caspian Sea. In 1826 another Russian war broke out. Persia again defeated and was compelled to cede Armenia to Russia. Futteh Ali died in 1834 and was succeeded by his grandson Mehemet Shah, during whose reign the country grew constantly weaker and came more and more under Russian influence.

When, at Mehemet's death in 1848, Nasr-ed-Din came to the throne, he found the country in confusion; but he established himself firmly and planned a policy of expansion. Against the Turkomans and several neighboring tribes he was successful, and he asserted the claims of Persia in Afghanistan and Baluchistan. The English government objected to this expansion of territory and compelled him to sign an agreement not to interfere in the affairs of these countries, putting a stop to whatever thoughts of further conquest he may have entertained. In 1896 he was fatally shot by a religious fanatic and was succeeded by his son, Muzaffar-ed-Din. Muzaffar-ed-Din did away with the office of grand vizier and, assuming control of his cabinet of twelve ministers, at once proposed energetic reforms, some of which were carried out. The taxes on foods were reduced, the civil service was reformed, and revolts and conspiracies were sternly repressed.

In 1906 a strong demand for a constitutional parliamentary government resulted in the call for a national assembly. This body convened in Teheran on October 7, 1906. Soon after this, Muzaffar-ed-Din abdicated, and in 1907 his son, Mohammed Ali, was crowned shah. A new constitution was granted giving Parliament control of finances. Trouble arose between the assembly and the shah, and ere long the country was plunged into a civil war. The parliamentary party, or Nationalists, won, and in 1909 the shah was deposed and exiled. On July 17, his son, Ahmed Mirza, a child of seven was proclaimed shah under the regency of a prominent Nationalist.

Meanwhile, in 1907, the Anglo-Russian agreement for the economic partition of Persia had been consummated. Russia used its power against Parliament, and stirred up all sorts of internal disorder. On the recommendation of Mr. Taft, President of the United States, W. Morgan Shuster was given charge of financial matters in 1910. His wise administration and just collection of taxes created dissatisfaction among the wealthy Persians, who preferred the old policy of bribery, and under pressure from Russia Shuster was compelled to resign. He was succeeded by a Belgian selected by Russia and Great Britain. The Belgian treasurer-general resigned in 1914, and the same year the regency was abolished. Parliament ceased to exist as a legislative body after November, 1915, but if the country is left to work out an orderly government, unhindered by European intrigue, parliamentary government may be reëstablished.

Persia made vigorous demands of the peace conference which assembled at the close of the World War. It asked for freedom from interference in its domestic affairs, and indemnity for losses incurred by the war. Both Russians and Turks had used Northwestern Persia as a field for their military operations, and Tabriz had been occupied successively by the forces of the sultan and the czar. Persia also asked for sections of Transcaspia and the Southern Caucasus as a defense against Bolshevism, and requested the guardianship of certain holy cities in Mesopotamia.

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HISTORY

Alexander the Great	Greece (history)
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PERSIAN GULF, a gulf separating Persia from Arabia and communicating with the Arabian Sea by the Strait of Ormuz. Its greatest length is 520 miles, its average breadth, about 180. It receives the waters of the united Tigris and Euphrates and of a number of small streams. There are many islands in the gulf, the largest of which are Kishm, Ormuz and the Bahrein islands. In the neighborhood of the latter there are important pearl fisheries.

PER'SIAN WHEEL, or **NO'RIA**, an ancient machine for raising water for irrigation. It consists of a water wheel, with revolving buckets, and is variously constructed and operated. One type of noria is operated in streams. The running water fills the buckets and at the same time turns the wheel; when a filled bucket reaches the highest point, its lower end strikes a fixed obstacle and the water is discharged into a reservoir. In Portugal, Spain, Southern France and Italy, where this wheel is yet extensively used to draw water from ponds and wells, animals supply the motive power.

PERSIM'MON, or **DATE PLUM**, a wild fruit tree which bears a tomato-colored fruit of variable size. The American persimmon, which grows in all the Southern states, reaches a height of about sixty feet. The fruit, about the size of a walnut, is pulpy and succulent and contains several oval seeds. Although the fruit of some species matures early, most persimmons are not fit to eat until after the first frost. The Japanese persimmon, a much smaller tree than the American, is one of the principal fruit trees of Japan.

PER'SONAL PROP'ERTY, or **PER'SONALTY**, in law, things movable or temporary, as money, jewels, furniture, distinguished from things fixed or immovable, which constitute *real property*, in a general sense, as estates in land and its fixtures. Specifically, in law, the only firm distinction between real and personal property is the disposition after death, the former being inheritable, the latter being at the disposal of the administrator. Title to personal property can usually be transferred by verbal agreement, but real property can be transferred only by written contract. See CONTRACT; REAL PROPERTY; DEED.

PERSONIFICATION, *per sahn i fi ka' shun*, a figure in rhetoric used by writers who wish to produce an effect similar to but stronger than that produced by metaphor. In personification life is attributed to objects without life, as in the following:

O, Liberty! What crimes are committed in thy name.

Here *Liberty* is addressed as a person, and the presence of life is understood by inference. Personification is closely related to metaphor, in which there is always an implied comparison. It is not always possible to distinguish sharply between the two, as in the expression "angry skies." Here the metaphor could be regarded as personification, as the skies are given a human characteristic. See METAPHOR.

PERSPECTIVE, *per spek'tiv*, the art of representing objects upon a plane surface so that they appear as though they themselves were viewed from a given point. Perspective is intimately connected with all art. It is particularly important in the art of drawing and painting, as without correctness of perspective no picture can be entirely satisfactory. The part of perspective which relates to the form of the objects differs essentially from that which teaches the gradation of colors according to the relative distance of objects.

A person looking through a glass window at objects beyond will perceive the shape, size and location of every object upon the glass. If the objects are near the window, the spaces they occupy upon the glass will be larger than those occupied by similar objects at a greater distance. If they are parallel to the window, their shapes upon the glass will be parallel; if they are oblique, their shapes will be oblique. As the person alters his position, the location of the objects upon the window will also be altered. The horizontal line, or line corresponding with the horizon in every position of the eye, will be upon a level with it; that is, will seem to be raised as far above the ground upon which the spectator stands as is his eye.

If the person at the window draws with a pencil upon the glass the figure of an object seen through it, as if the point of the pencil touched the object, he will have a true representation of the object in perspective as it appears to his eye. However, representations of objects generally have to be drawn on opaque planes, and for this purpose rules have been deduced from optics and geometry, the application of which constitutes what is properly called the art of perspective. See DRAWING.

PERSPIRA'TION, a watery fluid secreted by the sweat glands in the skin. Ninety-nine per cent of it is water, but it contains small quantities of common salt, urea and other salts. Perspiration that evaporates as fast as it forms is *insensible* perspiration; that which appears on the skin in drops is *sensible* perspiration. It is estimated that there are about 2,500,000 sweat glands distributed over the body, and the quantity of perspiration discharged by a healthy person varies from twenty-five to seventy ounces in twenty-four hours.

Violent exercise, extreme suffering and a high temperature increase the quantity of perspiration above normal. Fever which closes the pores of the skin diminishes the quantity. In hot weather the evaporation of perspiration helps to keep the temperature of the body at normal, about 98° F. Perspiration is essential to health, since certain poisonous substances are removed from the system through the sweat glands. As the perspiration evaporates, it leaves a thin film on the skin, which makes frequent bathing necessary.

PERTH, *purth*, WESTERN AUSTRALIA, the capital of the state, situated on the Swan River, twelve miles above its port, Fremantle. It has the range of the Darling Mountains for a background. The chief buildings include a city hall, the governor's palace, a mechanics' institute and an observatory. The city also has barracks and a large park. Population, 1911, including Fremantle and suburbs, 106,792; in the city proper, about 60,000.

PERTH AMBOY', N. J., Middlesex County, fifteen miles south of Newark, on Raritan Bay, at the mouth of the Raritan River, and on the Central of New Jersey, the Lehigh Valley and the Pennsylvania railroads. It was settled by people from Scotland about 1683, on the site of an Indian village called Amboy. They named the place Perth in honor of the Earl of Perth, and the Indian name was added later. It was the capital of the Province of New Jersey up to the Revolution. There is an excellent harbor and considerable shipping, especially of coal. In the vicinity are deposits of fire clay, and the city has extensive shipbuilding yards, large

smelting and refining plants, and brick, and steel works, railroad shops and other factories. One of the largest terra cotta plants in the world is here. The municipality has a Carnegie Library, city hall park, a Federal building, a Y. M. C. A., a hospital and four banks. Population, 1910, 32,121; in 1917, 42,646 (Federal estimate).

Typical native types

PERU, a republic in the northwestern part of South America, having a coast line on the Pacific Ocean of about 1,000 miles. It is bounded on the north by Ecuador and Colombia; on the east by Brazil and Bolivia; on the south by Bolivia and Chile, and on the west by the Pacific Ocean. Its length from north to south is about 1,100 miles, its greatest breath, 700 miles. The boundary between Peru and Colombia is in dispute, and the exact area is uncertain, but it is about 790,000 square miles, or a little over one-fifth that of the United States.

The People. More than one-half the inhabitants are Indians. About one-fourth are *mestizos,* or people of mixed Spanish and Indian or Spanish and negro blood, and one-fourth are whites who are nearly all Spaniards. There are a few negroes and a few Chinese. The white inhabitants represent the culture of Spain, and the Spanish language is spoken with a purity equalled in no other country in America. The Indians, who are descendants of the original Quichuas, are industrious farm laborers or shepherds. The mestizos are engaged in mining, transportation and trading in cattle. Nearly all the inhabitants are communicants of the Roman Catholic Church.

Surface and Drainage. Two ranges of the Andes Mountains traverse the country from northwest to southeast and divide it into three physical regions. The first is the coast region, with an average breadth of 20 miles, which is mostly a desert. The second is the interior plateau and mountain region, generally known as the Sierra, consisting of a broad plateau, upon which the ranges and spurs of mountains rest. These are interspersed by high valleys and deep ravines. The loftiest summits are in the south, and many of them rise above the snow line, several attaining an elevation of 20,000 feet or more. While much of this region is cold and barren, in the main it is the home of the greater part of the population of the country. To the east of the mountains is the third region, known as the Montaña, a tropical region, well watered and densely wooded. This slopes from the foothills of the Andes to the low plains of Brazil and is by far the most fertile portion of the country.

The rivers of the coast region are short, rapid, unimportant and unsuited to navigation, but their water is used in irrigating the land adjoining their banks, and each river valley is clothed with abundant vegetation. The other streams rising in the valleys between the Andes or on the eastern slope take a northward direction and unite directly with the Amazon or with some of its tributaries. In the northern part of the country are the head waters of the Amazon, which is known as the Marañon until it is joined by the Ucayali, the great river of eastern Peru. Lake Titicaca, in the extreme southeast, lies partly in Peru and partly in Bolivia.

Climate. Along the coast the climate is hot, dry and somewhat unhealthful, but in the uplands of the interior it is mild and salubrious, the temperature at Lima in summer ranging from 80° to 84° and in winter from 60° to 64°, while on the eastern slope the temperature ranges from temperate to tropical, and the rainfall is heavy. The highest altitudes have a cold climate. The peculiarity of the rainfall is due to the fact that Peru lies in the path of the trade winds, which bring an abundance of moisture from the Atlantic. The eastern slope of the mountains robs the winds of most of this moisture, however, some reaches the intervening valleys, while the western slope has scarcely any, the annual precipitation there being less than five inches.

Minerals and Mining. Minerals constitute the chief source of Peru's wealth; and the value of the mineral output is about $25,000,000 a year. Copper is the most valuable, followed by silver, crude petroleum, coal, gold and lead. Cerro de Pasco is the most important mining region. Copper is found along the coast, and there are large deposits of lead, bismuth, tin and silver. Coal is found in the central part of the country, and

a million barrels of petroleum are produced annually by the oil fields near Lake Titicaca. Vanadium was discovered in 1904, and Peru now supplies nearly three-fourths of the world's output of that metal. Guano is exported in large quantities, and the export of sulphur is annually increasing. Owing to lack of transportation facilities the mining industries have not been extensively developed.

Agriculture. In the valleys and uplands the soil is highly fertile, and wherever sufficient moisture can be obtained abundant crops are raised. In the lowlands the chief crops are sugar cane, cotton and rice, the first being considered the staple and affording the most valuable agricultural product for export. In the higher lands grains common to the temperate regions are raised. Fruits also are cultivated, and the manufacture of wine is becoming an important industry. The eastern part of the country is covered with dense forests, and its most important exports are forest products, consisting of rubber, cinchona, dye stuffs, medicinal drugs and, in the cultivated portions, cocoa, which is raised in quantities. Alpaca, sheep and llama wool are exported.

Manufactures. The manufacturing industries are few and of little importance. There are a few cotton factories in the larger towns; some clothing, furniture, boots and shoes, soap, lard, olive oil and cottonseed oil cake are manufactured. The Indians are noted for their skill in the manufacture of straw hats, which are sold as Panama hats, though they are made of a different fiber from the Panama hats of Ecuador.

Transportation and Communication. In 1919 there were about 1,800 miles of railway in operation and over 3,000 miles under construction or being surveyed. The lines in operation connect the principal cities of the country with each other. The line extending from Callao to Lima and thence to Oroya crosses the Andes at an elevation of 15,645 feet, and forms a part of the great trans-Andean railway system.

Peru has about 340 telegraph stations and 10,500 miles of lines. There is also a wireless system which gives Lima communication with the leading South American countries and some of the islands in the Pacific. There are about 800 postoffices, but off the lines of railway transportation of the mails is slow, owing to lack of good roads.

Commerce. The most important agricultural exports are sugar and cotton, Copper, silver and petroleum form the most important mineral exports. Minor exports include rubber, cinchona, alpaca, wool and panama hats. The imports consist of manufactured goods, machinery and such other products as the country cannot produce. The leading countries with which the commerce of Peru is carried on are the United States, Great Britain and (before the World War) Germany. Since the war commerce with the United States has increased rapidly. The monetary unit of Peru is the libra, equal in value to the English pound and in United States money to $4.866.

Government. The country is a republic, and its present constitution quite closely resembles that of the United States. The executive power is vested in a President, who, with two Vice-Presidents, is elected by popular vote for four years. The President is ineligible for the next succeeding term. The President is assisted by a Cabinet of six members. The legislative power is vested in a Senate of fifty-two members and a Chamber of Deputies of 116 members, elected by popular suffrage and apportioned among the political divisions according to population.

Education. Free public schools are maintained by the municipalities, and theoretically attendance is compulsory, though the law is not strictly enforced. High schools are maintained by the government in the capitals of the various departments, and the University of San Marcos has departments of law, literature, theology, medicine and political science. There are also small universities at Arequipa, Cuzco and Trujillo, and a school of mines and engineering is located at Lima.

Cities. The chief cities are Lima, the capital; Callao and Cuzco.

History. Peru was the center of a vast empire ruled by the Incas, who, previous to their conquest by the Spaniards, extended their sway over a large part of what is now Chile, Bolivia, Ecuador, Brazil and northern Argentina. Owing to internal dissensions the Incas were easily conquered by the Spaniards early in the sixteenth century, and Peru became a Spanish colony. The early Spaniards abused the natives in a most cruel manner, until the sufferings of these unfortunate people caused the home government to take action in their behalf, when a more humane policy was instituted. During the

sixteenth and seventeenth centuries, the colony of Peru, together with other South American colonies, was torn by dissensions between contending rulers and factions. In 1718 the Province of Quito was separated from Peru, and sixty years later a large portion of the southern territory was added to the government of Buenos Aires.

In 1816 Peru attempted to gain its independence, but was not successful. However, with the assistance of English volunteers and troops from Chile and other South American countries, it succeeded in 1821. From that time to 1883 the country was frequently involved in war with adjoining states or was torn by civil dissension. The last wars with Chile and Bolivia were particularly disastrous, since Peru was enabled to make peace only by ceding considerable territory. The boundary line between the country and Colombia is still unsettled and remains a possible source of future difficulty. Since the last struggle the country has been comparatively peaceful and prosperous. As an act of sympathy toward the United States Peru severed diplomatic relations with Germany, in October, 1917. Population, about 4,500,000.

Related Articles. Consult the following titles for additional information:

Andes	Inca
Callao	Lima
Cuzco	Pizzaro, Francisco
Guano	Titicaca, Lake

PERU', Ill., in La Salle County, sixty miles northeast of Peoria, at the head of navigation on the Illinois River, which is crossed by four bridges, and on the Illinois & Michigan Canal and the Chicago, Burlington & Quincy, the Chicago, Ottawa & Peoria and the Chicago, Rock Island & Pacific railroads. It has a picturesque location and contains a public square and public parks. Saint Bede College (Roman Catholic) is located here, and other prominent buildings are a Carnegie Library, People's Hospital, Turner Hall and Masonic Temple. Peru is near deposits of bituminous coal, white sand rock and cement rock, and it has a foundry, a machine shop, a planing mill and manufactures of scales, clocks, implements and various other articles. In the vicinity are interesting relics of the Mound Builders. The place was settled in 1827 and was chartered as a city in 1852. Population, 1910, 7,984; in 1917, about 8,100.

PERU, Ind., the county seat of Miami County, seventy-five miles north of Indianapolis, on the Wabash River and on the Lake Erie & Western, the Wabash and the Chesapeake & Ohio railroads. The city contains three railroad shops, electric, carbon and steel works, candy factories, woolen mills, manufactories of pianos, furniture and automobile parts. Peru has a public library, Boyd Park, two sanitoriums and the Wabash Railroad Hospital. It was incorporated in 1848. Population, 1910, 10,910; in 1917, 12,491 (Federal estimate).

PERUGINO, *pa ru je'no*, (1446–1523), so called because he was born near Perugia, Italy, was one of the foremost painters of the early Italian Renaissance. His real name was Pietro Vannucci. Taught by some of the greatest painters of this time, he in turn, rose to mastery of his craft and became the teacher of Raphael, one of the greatest of Italian artists. The rich, warm color of Perugino's canvases, the sweetness and gentleness of his faces are reflected in the work of his illustrious pupil. Perugino was one of the first Italian painters to use oil colors. He received so many commissions a large amount of the work of his studio was executed by assistants. He executed an important series of frescoes for the Sistine Chapel, Rome, some of which still remain. Fine specimens of his frescoes are also preserved at Perugia, Bologna and Florence.

PERU'VIAN BARK, the bark of various species of trees belonging to the cinchona family. It is valued for the quinine it contains. The trees are native to South America, particularly Peru. See Quinine.

PESETA, *pa say'tah*, the standard money unit in Spain, having the same intrinsic value as the French *franc* and the Italian *lira*. It is equivalent to 19.3 cents in United States and Canada money. The peseta is silver; it has on one side the head of the king, and on the other the Spanish coat of arms. Two-peseta silver pieces are made; and five, ten, twenty and twenty-five peseta pieces are coined in gold. "Peseta" means *little peso*. See Peso.

PESO, *pay'so*, the name given the monetary unit in Mexico, in Central America and in most South American countries. The value of the peso varies with location. The peso of Mexico is equivalent to $0.498 of United States and Canada money, that of Central America to $0.39, while in Uruguay it is of practically one dollar in value. The peso originated in Spain, where formerly coins

of this name were made in gold and in silver, the former called *peso de oro,* and the latter *peso de plata.* To-day the monetary unit of Spain is the *peseta* (which see).

PESSIMISM, *pes'i mis'm,* a dark view of life held by those who believe there is more evil than good in the world. The advocates of this doctrine find justification for it in what they consider the unmerited and unreasonable suffering that forms so large a part of common experience. Though ordinarily regarded as merely the product of morbidness, pessimism, in its best expression, is a craving for perfection, for a brighter and more joyous life than the one we know, and its gloom is proportional to the extent life fails to measure up to the ideal. The pessimistic view of life is developed and systematized in the philosophy of Schopenhauer.

PESTALOZZI, John Heinrich (1746–1827), one of the most celebrated educational reformers of the nineteenth century, was born at Zurich, Switzerland, and educated in the Zurich Latin School and the public university. Early in life he became acquainted with the wretchedness of the lower classes, and after failing in several occupations, he decided to devote his life to the work of a teacher. He opened his house at Neuhof to the children of the poor, and in addition to the instruction of the home, he used his farm as a means of giving them industrial training. However, his efforts were not appreciated, and his enterprise failed for want of proper support. But his experience had made him so thoroughly acquainted with the conditions of society that he resolved to continue the work. About this time he published *Leonard and Gertrude,* a work in which he set forth his ideas of education.

JOHANN HEINRICH PESTALOZZI

In 1798 he opened a school at Stanz for orphan children who had been deprived of their homes through the French invasion of Switzerland. Within a few months, however, the military situation compelled him to abandon the school, and he removed to Bergdorf where he opened a tuition school, which was later removed to Yverdun. It was in this school that Pestalozzi established his reputation as an educational reformer. Here he gathered about him pupils from nearly every country of Europe and from the United States. Such was the reputation of his school that it was visited by the rulers and leading educators of the world. However, he was not a good administrator, and within a few years dissensions arose among the faculty, which caused the school to lose its influence, and finally Pestalozzi was obliged to give it up. He died in comparative poverty.

Pestalozzi's Influence. The value of Pestalozzi's work as an educator consists largely in the principles which he set forth and attempted to put into practice. He believed that the principles of education were to be found in human nature, and that this nature consisted of physical, intellectual and moral capabilities, all of which should be trained. He also believed that it was the duty of the teacher to remove obstructions from the way of his pupils and to stimulate them in the exercise of all their powers. He was a strong advocate of education through observation, or the cultivation of the senses, and believed that all knowledge began in this way, and that the child should acquire his ideas through his own activity, under the direction of the teacher. He was a strong advocate of industrial education and believed that it should go hand in hand with intellectual and moral training. The soundness of his principles is shown from the fact that they now form the foundation of the system of instruction in the normal and public schools of America and the leading countries of Europe. Consult De Guimps' *Pestalozzi, His Life and Work.*

PETAIN, Henri Philippe (1856–), a great French military leader, the hero of the defense of Verdun, and one of three generals who were awarded the title of marshal of France for services rendered during the World War. The others were Joffre and Foch. Pétain was born near Calais, and was educated at the military school at Saint Cyr. In August, 1914, at the outbreak of the World War, he was a colonel, but was at once placed in charge of a brigade, and by September had been made general of a division, because of the valiant conduct of his brigade in the retreat from Charleroi to the Marne. In the spring of 1915 he led the 23rd army corps in the Battle of Champagne, and in

February, 1916, took charge of the defense of Verdun. His splendid service during the critical weeks of the German drive made him a national hero, and everyone rejoiced when he was made commander in chief of the French armies on the Western front, in May, 1917. A year later all the allied armies were placed under the supreme command of General Foch, a step which resulted in victory for the entente. In November, 1918 General Pétain entered Metz at the head of his victorious troops, and in that city, in the following month, he received from President Poincaré the baton of a marshal of France.

PETER, or **SIMON PETER**, one of the leaders of the Twelve Apostles. Little is known of his early life. Previous to his call by Jesus, he and his brother Andrew were fishermen on the Sea of Galilee. Both were attracted by the preaching of John the Baptist, and they followed him. Later when called by Jesus, they gave up their calling and devoted the remainder of their lives to the propagation of the Gospel. During Jesus's brief career upon earth, Peter was one of his most devoted followers, and after the ascension he was recognized as the leading spirit in the movement to spread Christianity. A comparatively full account of his activities is found in the *Acts of the Apostles*. He was the author of two books of the New Testament, the *First Epistle General of Peter* and the *Second Epistle General of Peter*. It is said he was put to death by crucifixion at about the same time that Saint Paul was executed.

PETER I, Alexeyevitch (1672–1725), a czar of Russia, known in history as Peter the Great. He was neglected in his childhood and youth, and he picked up his education in the streets. As a youth he had insatiable curiosity, keen intelligence, precocity and strong will. On the death of his brother Feodor, Peter was declared czar, but his ambitious half-sister Sophia was actual ruler. When he was seventeen he wrested the power from her and shut her up in a convent. In 1697 he visited Holland and England and in those countries worked for two years at manual trades, chiefly shipbuilding. Returning to Russia, he wrought a transformation in national ideals. He created a navy, founded schools, imported foreign artisans, established manufactories of arms, tools and fabrics and improved the roads and canals throughout the country. He reformed dress, improved the status of women and purified the civil administration, making merit the sole requisite for appointment to office. His reforms offended the conservatives, and insurrections arose, in which his wife and son, Alexis, heir to the throne, were implicated. He condemned Alexis to death and his wife to life imprisonment.

PETER THE GREAT

The chief objective in Peter's foreign policy was to secure an outlet to the ocean through ice-free ports, and in pursuance of this he wrested the Baltic provinces from Charles XII of Sweden, built Saint Petersburg—now Petrograd—which was to be a naval base commanding the Baltic waters, and constructed the harbor of Kronstadt. He made war on the Turks and established a foothold on the Black Sea. The aim of the later czars, either to neutralize or possess Constantinople, was a logical sequence of this policy. In 1712 Peter married his mistress Catherine, who was crowned in 1724 and succeeded him as Catherine I.

PETER I, Karageorgevitch (1846–), the World War king of Serbia. He was born at Belgrade and educated in Hungary and at the French military academy of Saint-Cyr. He fought as an officer in the French army during the Franco-German War and, returning to the Balkans, encouraged the revolt which led to the Russo-Turkish War of 1877 and ultimately to the establishment of Serbian independence. In 1883 he married Princess Zorka, daughter of Prince Nicholas of Montenegro. When, in 1903, King Alexander and Queen Draga of Serbia were murdered, Peter was elected king. He was firm in opposition to the Austro-Hungarian policy with respect to Serbia, and when the difficulties between the two countries culminated in the World War in 1914, he took the field with his army. In 1915, when the forces of the central powers occupied Serbia, Peter and his court removed to Greece. After the surrender of the Germanic allies and the restoration of Serbia, in the fall of 1918, the aged king remained in retirement near Athens, leaving the actual administration of af-

fairs to his Cabinet and the heir apparent, Prince Alexander. The latter was chosen regent of the new Jugo-Slavic state in 1918. See JUGO-SLAVIA; SERBIA.

PETERBOROUGH, ONT., the capital of Peterborough County, on the Otonabee River, the Grand Trunk and the Canadian Pacific railroads, and the Trent Canal. It is about seventy-five miles northeast of Toronto. It is a well-built city, in the midst of a beautiful lake country, is the seat of a Catholic bishop and has a provincial normal school. There are four parks, a library and good municipal buildings. The lock on the canal here is one of the largest hydraulic locks in the world, with a lift of sixty-five feet. There are manufactures of cereals, furniture, machinery, agricultural implements, wooden ware and iron castings, and there are pork-packing establishments. The trade is large, especially in grain, pork and lumber. Population, 1911, 18,360 ; in 1917, 23,500 (estimate)

PETERSBURG, VA., at the juction of Chesterfield, Dinwiddie and Prince George counties, is twenty miles south of Richmond, on the Appomattox River, crossed by two steel bridges, on the Upper Appomattox Canal and on the Norfolk and Western, the Atlantic Coast Line and the Seaboard Air Line railroads. The place was settled in 1733 on the site of an Indian village destroyed in the seventeenth century. It was incorporated as a town in 1748 and as a city in 1850. Because of its being an important railroad center, it was the scene of constant fighting during the last year of the Civil War in America (see PETERSBURG, SIEGE OF). Fourteen battles were fought in and around the city.

The city is in an agricultural region in which tobacco is the chief product. It is also a center for peanut shipments. There is good water power, and the manufactures include tobacco, cotton, silk, knit goods and other articles. The city has the Southern Female College, the Virginia Normal and Industrial Institute for colored students and the State Central Hospital for colored insane. Other important structures are the Y. M. C. A. building, the Home for the Sick, the Benevolent Mechanics' Association building, with its library and museum, and the Masons', Odd Fellows' and Red Men's buildings. Population, 1910, 24,127; in 1917, 25,817 (Federal estimate).

PETERSBURG, SIEGE OF, a famous siege of the Confederate position at Petersburg, between June, 1864, and April, 1865. The Federal army was commanded by Grant, who, after his famous Virginia campaign, took up his position before Petersburg, with the intention of capturing this point and thus compelling Lee to evacuate Richmond, Va., the capital of the Confederacy, twenty miles distant. An assault made on the fifteenth of June by General Butler failed, and other assaults on the three following days were equally unsuccessful. On July 30 occurred the fiasco of the famous Petersburg mine. General Burnside ran a mine under the Confederate fort for the purpose of opening a gap through which to make a charge. Inefficient leadership caused the Federals to be trapped, and 4,000 were killed. On April 2, 1865, a continuous bombardment of more than a week compelled the Confederates to evacuate, and the following day Lee retreated from Richmond. Six days later Grant and Lee met at Appomattox Court House and arranged terms of surrender, the act which ended the war.

PETER THE HERMIT (about 1050–1115), an enthusiastic monk of Amiens, whose preaching started the First Crusade. He went through France on a mule, clad in a hermit's robe and carrying a crucifix, preaching the duty of Christians to free Jerusalem from Mohammedan rule. More than 30,000 responded to his call. He led this undisciplined band across Southern Europe, but few reached Palestine, for nearly all perished of starvation and disease. Peter, with his followers, joined the army of Godfrey de Bouillon, and he distinguished himself at the storming of the Holy City. On his return to his native country he founded the abbey of Neufmoustier and died there.

PETITION, *pe ti'shun*, a formal written request made to a legislative body, a court or an officer in authority to grant it, for reform in government, the enactment or repeal of certain laws, the pardon of one convicted of crime, etc. The right of petition is one of the fundamental conditions of a free government, and it is guaranteed the people of the United States by the Constitution. The first amendment provides that Congress shall make no law "abridging the right of the people peaceably to assemble, and to petition the government for redress of grievances."

PETITION OF RIGHT. When Charles I assembled Parliament in 1628, one of the first actions of the House of Commons was to draw up a statute detailing the grievances they had against the king, and this statute, from the form in which it was presented, was known as the Petition of Right. It made no pretense of being a new law, but simply rehearsed the old statutes, which Charles had violated, and demanded that the ancient rights be confirmed. Besides the most important provision, that freemen should not be arrested without due legal process, it cited those statutes which forbade the levying of taxes or loans without the consent of Parliament, the quartering of soldiers upon private citizens and the proclamation of martial law in time of peace. Charles attempted to return an equivocal answer to this document, but was obliged to assent to it when Parliament began proceedings against the duke of Buckingham.

PETRARCH, *pe'trahrk*, FRANCESCO (1304–1374), an Italian poet and scholar who has written some of the noblest lyrics in all literature and who exercised an inestimable influence over the poets of Europe. He was born at Arezzo. At Avignon, in 1327, he first saw in the Church of Saint Claire the Laura who exercised so great an influence on his life. After this meeting Petrarch remained at Avignon three years, singing his purely Platonic love and haunting Laura at church and in her walks. Later he visited leading cities of France, Italy and Germany. Upon his return, he bought a small estate at Vaucluse, near Avignon, that he might be near Laura. At intervals during the rest of his life, he traveled again through Italy, and many honors were bestowed upon him. In 1341 he was called to Rome to receive the laureate crown awarded for his Latin poem, *Africa*, an epic on the Punic wars. At Parma Petrarch learned of the death of Laura, which he celebrated in his *Triumphs*. After 1360, he spent his remaining years in literary pursuits, at Arqua, near Padua. Although Petrarch based his hopes of fame upon his scholarly Latin works, these are now practically forgotten, while his Italian verse, of which he thought comparatively little, has exalted him for all time.

PET'REL, an interesting sea bird about the size of a large duck. It has somber plumage, long legs, webbed feet and a broad, flat tail, and is a strong, swift flyer, sailing about with little visible movement of its wings and often gliding along close to the waves with a rapid, graceful movement, apparently running on the surface of the water.

MOTHER CAREY'S CHICKENS

Flocks of these birds will follow a ship many miles from shore for the refuse in its wake. When exhausted the bird settles down upon the water like a duck to rest, tucking its head under a wing. Petrels breed in colonies, on rocky, desolate coasts. Only one egg is laid at a time, in a crevice of rock or in a burrow which the bird makes in the ground.

Petrels are at home in both the northern and southern hemispheres. Of the several species the best known are *Wilson's petrel*, a large Antarctic bird; *Leach's petrel*, a native of the northwestern shores of North America, and the *stormy petrels*, also called *Mother Carey's chickens*. This last bird, which lives far out over the Atlantic and is rarely seen near shore, is regarded by sailors as a sign of foul weather. It is only five inches long, the smallest of all web-footed birds.

Peter the Great, founder

PETROGRAD, formerly called SAINT PETERSBURG, from 1703 until March, 1918, the capital of Russia. In March, 1917, the imperial government of the czar was overthrown and a democratic régime succeeded to power. Petrograd, a great city of over 2,000,000 inhabitants, remained the seat of government for about a year. In the fall of 1917 the moderate Socialist government headed by Alexander Kerensky was supplanted by the radical government of Lenine and Trotzky, and in the following March they made Moscow their capital, because of its central location. Petrograd is situated on

the Neva River where it enters the Gulf of Finland, and is 400 miles northwest of Moscow. The city is built upon low land which is subject to overflow, and much of this is protected by walls and by the construction of canals, which receive the surplus water. Before entering the gulf, the Neva divides into several arms, forming a delta, most of which is within the city limits. The main branch, known as the Great Neva, divides the city into two chief divisions, the right side, which was the nucleus of the city in the time of Peter the Great, and the left or "great" side, on the mainland to the south, which became the center of business, fashion and government. These sections and the numerous islands occupied by the city are connected by over 120 bridges, some of which are supported on pontoons, so that they can be removed during the winter.

The left side, or "great city," is divided into four quarters, the most important of which is the admiralty quarter, on the south bank of the river and in the center of the city. This quarter is so named from the admiralty building, a structure about 1,600 feet long, which contains the admiralty offices and a museum. From this square the four principal streets of the city radiate. Of these the Nevski Prospekt, 130 feet wide and about four miles long is the finest. On the

southeast of the admiralty building are the Alexander Gardens, and on the southwest is Peter Square, containing a colossal equestrian statue of Peter the Great; beyond this square are the buildings of the senate and the Holy Synod. To the southwest of the admiralty is the Cathedral of Saint Isaac, the most celebrated cathedral of the city. It is built in the form of a Greek cross and is surmounted by a large gilded dome. The porticoes are single pillars of polished granite, over fifty feet high. To the northeast of the admiralty extend the palaces, the most famous of which is the Winter Palace of the former czars. It was the center of bitter struggles during the revolution which overthrew Kerensky. Adjoining the Winter Palace is the Hermitage, which formerly contained one of the finest art galleries in Europe. In Palace Square, to the southeast of the Winter Palace, is the Alexander Column, a monument nearly 100 feet high, erected to Alexander I.

One of the islands is occupied by the old Fortress of Saints Peter and Paul, which was the original nucleus of the capital and is now used as a city prison. Within this enclosure is also the Cathedral of Saints Peter and Paul, in which it was once the custom to bury the czars and other members of the royal families. Another island is occupied by the University of Petrograd and other prominent educational institutions, while a third is the site of a fine botanical garden.

Petrograd was formerly the literary and intellectual center of Russia and it supported a number of higher institutions of learning, including the University of Petrograd, the Academy of Sciences, with a library of over 500,000 volumes; the Institute of Technology, an industrial school; the Conservatory of Music, founded by Rubinstein, and numerous schools for the higher education of women, as well as technical schools in medicine and the various branches of natural science. The Imperial Public Library contains over 1,300,000 volumes and nearly 40,000 manuscripts.

Petrograd was also the great commercial and industrial center, and notwithstanding the fact that its port is closed by ice during several months of the year, its exports and imports were extensive. The industrial portion of the city is located on the right or Petrograd side, where are found most of the large factories and the residences of the workmen. The leading industries were the manufacture of textiles, india rubber goods, tobacco products, leather, machinery and various stone products. The city was the western terminus of the Trans-Siberian and other important trunk lines of railroad.

The fort erected by the Swedes at the mouth of the Neva was captured by Peter the Great in 1703, and he immediately decided to make this the site of the capital of the empire. By 1712 he was enabled to remove the government to the new capital, and from that time the city increased in population and importance, until it became one of

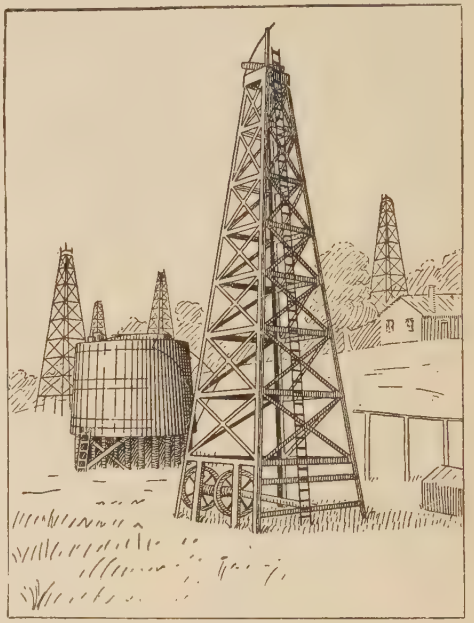
the most distinguished capitals of Europe. In 1914, as a result of the great World War, there was such bitter feeling against all things German, that the czar, by special edict, changed the name from Saint Petersburg, a German form, to Petrograd, which is Russian for "Peter's City."

Under the régime of the Bolsheviki it rapidly declined in population, and its prosperity entirely departed. By March, 1919, the number of inhabitants had decreased to 800,000, and people were then dying at the rate of 200 to 500 a day. About nine-tenths were underfed, about five per cent actually dying of starvation. Commerce and trade had practically ceased, and all necessities of life were sold through communal stores controlled by the government. Few trains entered or left the city because of the bad condition of the rolling stock, and life had become a desperate struggle for bread and fuel. Such was the pitiable condition of the once proud capital of the czars. See RUSSIA; WORLD WAR.

PETROLEUM, a mineral oil occurring in rock or sand in various parts of the world, but produced most extensively in Russia and the United States.

Oil Wells. In some localities where petroleum is abundant, it reaches the surface in small quantities, but for commercial purposes it is obtained by boring wells into the sand or rock where it is stored (see WELL BORING). Occasionally the oil is confined under great pressure, and when the reservoir is opened it flows with a steady stream which may rise many feet into the air. Such a well is known as a *gusher*. From most wells, however, the oil must be pumped. When the flow has diminished so that further pumping is unprofitable, it may be restored by "torpedoing," that is, by exploding a charge of dynamite at the bottom of the well. This removes any obstruction, such as an accumulation of paraffin, and also loosens the oil-bearing sand, and the flow is resumed. Oil wells vary in depth from 100 to over 500 feet. Usually the largest flow comes from the deep wells.

Refining. As it comes from the wells, petroleum is a dark-colored, oily liquid, varying in shades from brown to black, and in thickness from the consistency of kerosene to that of warm tar, or molasses. Before petroleum can be used for many purposes it has to be purified, or *refined*. Crude petroleum contains a number of valuable substances, which are easily separated from each other by distillation. The oil is placed in large iron tanks containing about 600 barrels each and is heated slowly. The most volatile



OIL WELLS AND TANKS

substances—naphtha and benzine—are separated at a low temperature. Then, as the temperature is raised, follow gasoline and kerosene. From the contents of the tank still remaining are obtained lubricating oil, vaseline and paraffin wax, and the solid matter still remaining is made into coke. Over 200 commercial products are obtained from petroleum.

The products obtained by the first distillation are further purified by means of redistillation with a small quantity of sulphuric acid. Of these gasoline and kerosene are the most important.

Transportation. The oil and its refined products are transported in various ways. For the transportation of crude oil, pipe lines (which see) lead from the oil regions to the large refineries, the oil being pumped as far as from the Pennsylvania fields to Chicago. For the distribution of petroleum, tank steamers are constructed for water transportation, and tank cars, for transportation by railways. These cars are familiar sights on all lines of railway, and the oil company usually establishes in every large town a de-

pository, which consists of several metallic tanks, to contain the oil of different grades. As the cars arrive they are emptied into these tanks, from which the oil is distributed to the local dealers.

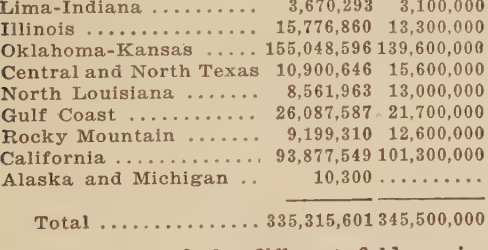
Uses. Crude petroleum is extensively used in Texas, New Mexico, Arizona and the southern part of California for fuel, also in many places for improving roads by the process known as *oiling*. When a thin coating of oil is spread over a road made of fine sand and soil, it gradually sinks into the surface and cements it together, drying and making a hard, durable surface.

Of the refined products, gasoline is the most important, because of its extensive use in motors to propel automobiles, aeroplanes and many other machines. Without the power furnished by gasoline the industries of the world would be sadly crippled. The product next in importance is kerosene, used for illuminating purposes and for tractors.

Production. The United States and Russia produce about nine-tenths of the world's supply of petroleum. Ordinarily Russia's output is about one-fourth that of the United States. The most important Russian oil fields are around the Caspian Sea, in the province of Baku. The country third in rank is Mexico. The output of the United States for 1917 and 1918 is given below:

Field.	1917.	1918.
Appalachian	24,932,205	25,300,000
Lima-Indiana	3,670,293	3,100,000
Illinois	15,776,860	13,300,000
Oklahoma-Kansas	155,048,596	139,600,000
Central and North Texas	10,900,646	15,600,000
North Louisiana	8,561,963	13,000,000
Gulf Coast	26,087,587	21,700,000
Rocky Mountain	9,199,310	12,600,000
California	93,877,549	101,300,000
Alaska and Michigan	10,300	.....
Total	335,315,601	345,500,000

The output of the different fields varies from year to year, and the state which leads one year may drop to second or third place the next year. In general, the production of the older fields falls off, and that of new fields increases for the first few years after the field is opened. A good illustration of this fact is found in Kentucky, in which oil was not known to exist in 1914; in 1919 the output was over 100,000 barrels.



FIGURES REPRESENT MILLIONS OF BARRELS
OIL PRODUCTION BY COUNTRIES
The figures represent the average annual production for a period of five years.

FIGURES REPRESENT MILLIONS OF BARRELS
STATE PRODUCTION
The yield is the average annual production during a five-year period.

History. The petroleum industry in the United States dates from 1859, when Col. E. L. Drake of Titusville, Pa., sank a well that produced 25 barrels a day. Colonel Drake's purpose in sinking the well was to obtain a supply of oil which he could put upon the market under the name of *Seneca oil*, as a remedy for rheumatism. Other wells immediately followed Drake's, and within two years the industry was firmly established in and about Oil City and Titusville. From that time the petroleum industry has continued to grow, until it has reached its present proportions. See BENZINE; GASOLINE; KEROSENE.

PETU'NIA, a flowering plant belonging to the nightshade family. The beautiful, fragrant blossoms range in tint from deep purple to violet, rose, pink and white. Many varieties are variegated. The leaves and stems of the plants are covered with a fine white fur. Petunias are natives of South America and Mexico, but are widely cultivated in all North American gardens.

PE'WEE. See PHOEBE.

PEWTER, *pu'ter*, an alloy of tin and lead, or of tin with proportions of lead, zinc, bismuth, antimony or copper, used for domestic utensils. It is a soft metal, similar in appearance to tin, but duller and darker. It was formerly used extensively in the making of plates and other domestic utensils, but because of the poisonous properties of the lead, measures prohibiting its use have been enacted in many countries, and other alloys largely have been substituted. Pewter dishes of olden times are highly prized by collectors.

PHAEDRA, *fe'dra,* in Greek mythology, daughter of Minos, king of Crete, and sister of Ariadne. She was sought in marriage by Theseus and was brought to Athens. There, however, she fell in love, not with Theseus, but with his son Hippolytus. As he refused to comply with her request and elope with her, she accused him to his father of having tried to kidnap her, and in response to the prayers of Theseus, Hippolytus was killed by Neptune. When his drowned body was thrown at the feet of Phaedra, she became repentant, confessed her sin and killed herself.

PHAETHON, *fa'e thon,* in classical mythology, the son of Apollo and Clymene. Mocked by his friends because of his boasting that the sun god was his father, he visited Apollo and asked his recognition. Apollo gladly acknowledged Phaethon as his son, and in response to a request, promised to prove their relationship by granting to Phaethon anything he might ask. When he begged to be allowed to drive the chariot of the sun for one day, Apollo endeavored in vain to dissuade the boy from this folly. Reluctantly he entrusted Phaethon with his fiery steeds, giving him strict directions how to drive. But the horses immediately recognized that their master did not hold the reins, and they dashed wildly out of their course, coming at times so near to the earth that they almost set it on fire and turned black the races living in Africa; at other times they rose so far above the earth that everything was frozen. Jupiter, seeing this destruction and fearing further consequences, struck Phaethon with a thunderbolt and threw him into the River Po. See MYTHOLOGY.

PHALANX, *fa'lanks,* or *fal'anks,* a name commonly given by the Greeks to the whole of the heavy armed infantry of an army, but more specifically to each of the grand divisions of that class of troops, when formed in ranks and files close and deep, with their shields joined and their pikes crossing each other. The Spartan phalanx was commonly eight files deep, while the Theban phalanx was much deeper.

PHANEROGAMOUS PLANTS, *fan ur og' a nus,* or **PHANEROGAMS**, *fan'ur o gamz,* the general name for that great class of plants which bear flowers. Flowerless plants are known as *cryptogams.* The chief distinction between the two great classes of plants is that the phanerogams produce seeds containing an embryo, while the cryptogams produce spores which are simple cells without an embryo. To the phanerogams belong nearly all of those plants which are conspicuous and most of those which are useful to man. See BOTANY.

PHARAOH, *fa'ro,* the title given in Biblical narrative to the kings of Egypt. The Pharaohs mentioned in the time of Abraham and Joseph were probably the Hyksos shepherd kings; the Pharaoh of the time of Moses was probably Rameses II. Pharaoh Necho is the first Pharaoh whose proper name is mentioned in the Bible.

PHARISEES, *fair'i seez,* a religious sect, influential among the Jews at the time of Christ, which played a prominent part in the events recorded in the New Testament. At the time of Christ the Pharisees stood as the national party in politics and religion, the opponents of the Sadducees.

To the written law of the Pentateuch, the Pharisees added an oral law to complete and explain the written law, which covered the minutest details of daily living with such precision that it weighted the people with "burdens too grievous to be borne." In fact, the strict observance of small points often led to hypocrisy and self-glorification. Besides subscribing to the oral law, the Pharisees believed in the continuance of life after death of the body and the resurrection of the dead. The sect contained a body of pious, learned, patriotic men, and after the Christian Church had organized itself independent of Judaism, they segregated themselves more than ever from the world. The laws of the Talmud, recognized as authority by the Jews of all nations, were the work of the Pharisees. Saul and his teacher Gamaliel were members of this sect.

PHARMACOPOEIA, *fahr ma co pe'ya,* a book containing a list of all standard drugs (with a description of each, showing its standard strength and purity) and directions for their use. Such books are compiled by experts, most of them by government authorization. The first United States pharmacopoeia was published in 1820. It was prepared at a convention of delegates from medical colleges and societies. Since then similar conventions have been held every ten years to revise the work. The latest edition appeared in 1915. This book is a legal standard in the United States, and registered pharmacists make use of it in their practice.

PHARMACY, the art of preparing, compounding and dispensing medicine. Physicians were the first pharmacists, for originally they prepared their own medicines, but as practice grew broader and drugs were more generally used, a separate profession, that of the pharmacist, naturally arose. The laws of almost every state now rigidly exact a technical education and drug store experience before licensing pharmacists to practice. Many schools, some of them connected with the most prominent universities in the United States, give, in courses extending over two or four years, the training necessary, though in most states the license to practice must be obtained directly from a specially appointed board of pharmacy.

PHAROS, *fah'ros*, an island in the Mediterranean, off the coast of Egypt, now occupied by a part of the city of Alexandria. The island was long celebrated for a lighthouse erected on it by Ptolemy I and regarded as one of the Seven Wonders of the World. This lighthouse was built on a square base 100 feet wide and was perhaps several hundred feet high. It was destroyed by earthquake in the fourteenth century. The classic poets used metaphorically the expression "Pharos flame" much as modern poets say "beacon light."

PHARYNX, *far'inks*, the term applied to the muscular sac which lies between the cavity of the mouth and the narrow esophagus, with which it is continuous. It is funnel-shaped, about 4½ inches in length and communicates with the two nostrils, the two Eustachian tubes, the mouth, the larynx and the esophagus. It aids in swallowing and in producing the higher notes of the voice.

PHEASANT, *fez'ant*, a group of large birds related to the barnyard fowls, brilliantly-colored and usually long-tailed. Pheasants, like domestic fowls, are polygamous. They roost in trees and feed on berries, seeds, herbs and worms. The eggs are olive-brown. These birds, natives of Asia and Eastern Europe, have been naturalized in various parts of the world. In England pheasants are among the commonest of game birds, and thousands of them are raised annually on the great preserves and are driven before the guns in the hunting season. Among the several species that have been introduced to English coverts are the *black-barred* and the *ring-neck Chinese* pheasants, the latter distinguished by its white collar and grayish-blue upper wing coverts, and the *green* pheasant and *copper* pheasant, both from Japan.

Some of the specimens of the Far East are very highly-colored. The *Chinese silver* pheasant, which ranges through Southern China, has white upper plumage finely pen-

SILVER PHEASANT

ciled with black, blue-black lower parts, and long, handsome, downward-curving tail coverts. The *peacock* pheasant, which ranges through Tibet and China, is so named because of the multitude of "eyes" on the plumage of the tail and upper parts. Among the showiest birds in the world is the *Argus* pheasant, which can spread a fanlike wing, exhibiting rows of delicately tinted iridescent circles that appear to revolve in sockets. A gorgeously-colored bird is *Lady Amherst's* pheasant, with breast of metallic green, upper plumage of scarlet, rump of golden yellow and chest of amber. About its neck is a ruff of orange tipped with dark blue.

PHELPS, *felps*, ELIZABETH STUART. See WARD, ELIZABETH STUART PHELPS.

PHENACETINE, *fe nas'e tin*, a white crystalline coal-tar product sometimes used as a remedy for fever and headache. It is similar in effect to antipyrine, and, although less dangerous than that remedy, it should never be given without a physician's prescription.

PHENIC, *fe'nik*, **ACID**, or **PHENOL**. See CARBOLIC ACID.

PHI BETA KAPPA, *fi' ba'ta kap'pa*, the oldest of the Greek letter societies, founded in December, 1776, at William and Mary College, in Virginia. The letters constituting the name are the initials of the Greek words meaning "Philosophy, the guide of life," which is the motto of the society. The insignia is a gold key. Gradually the society has lost its secret and social character and

has become a purely honorary organization, membership in which is conferred at graduation upon those students of colleges of first rank who have made a uniformly-high scholarship average throughout their college course.

PHIDIAS, *fid'i as*, the greatest of Greek sculptors, was born about 500 B. C., at Athens, and was the central figure in the stupendous art activity that helped to make the age of Pericles the most brilliant period of antiquity. Little is known of his life and the close of it is shrouded in mystery. It is probable that he was a victim of the political enemies of Pericles and that he died in prison.

The Parthenon sculpture has been attributed to him and it is probable he designed it, leaving the execution to his great pupils Alcamenes and Agoracritus. Phidias worked almost exclusively in ivory, gold and bronze, and rarely in marble. Among the earliest of his great works was a large group in bronze at Delphi including Apollo, Athena and several Attic heroes. To him has been attributed the colossal bronze statue of *Athena*, on the Acropolis at Athens, which was visible far out at sea. He made several other statues of Athena, but the greatest of such representations was the colossal ivory and gold statue of the goddess which stood within the Parthenon. This and the ivory and gold statue of *Zeus* at Olympia were the sculptor's crowning achievements.

None of the works of Phidias have come down to us; we know of his greatness only through ancient critics and historians. From them we know that he must have been a man of noble ideals, with a complete mastery of technic, and that his work was the highest expression in plastic art of the best culture of Greece. He idealized the human form and embodied in it superhuman power and divine majesty and grace. See PARTHENON.

PHI KAPPA PHI, a college society to which admission is extended only for unusually meritorious work during the college course. Membership is restricted to not more than one-third of the graduating class of each year, and election occurs a year before graduation. After graduation and experience in the affairs of life a person may be elected to honorary membership if he has distinguished himself in science, education or literature. The fraternity has organizations in about fifteen of the leading American colleges and universities.

Penn statue, Philadelphia

PHILADELPHIA, *fil a del'fe a*, PA., the metropolis of the state and the third largest city in the United States, has a unique place in American annals. Its historic Independence Hall sheltered the patriots who signed the Declaration of Independence, and the statesmen who drafted the Federal Constitution. In a quaint old house on Arch Street the first national flag was designed and made, and the building is still standing in which Washington was inaugurated for his second term as President, and which served as the meeting place of Congress during the period from 1790 to 1800. Philadelphia was the capital of the young nation throughout that decade.

The city was dominated by Quakers in the early period of its history, and its name is singularly appropriate, for it means *city of brotherly love*. Philadelphia is frequently known also as the QUAKER CITY and as the CITY OF HOMES. The last term is especially appropriate, for in no other city in America are found so many small houses owned by their occupants. About 315,000 out of 350,000 buildings are dwelling houses, while apartment buildings are in the minority. All of the older buildings and many of those of later construction are of red brick, and the houses have wide marble steps and trimmings, a style of architecture which gives Philadelphia a peculiar individuality.

Location and Population. Philadelphia is the county seat of Philadelphia County. It is situated on the Delaware River, at its confluence with the Schuylkill, about 100 miles from the ocean, ninety miles southwest of New York, 136 miles north of Washington and 822 miles southeast of Chicago. Railway transportation is provided by the Pennsylvania, the Philadelphia & Reading, the Baltimore & Ohio, the Lehigh Valley and other railroads. In 1910 the population was 1,549,008; in 1917, 1,709,518 (Federal estimate).

General Description. The city extends for twenty-two miles along the Delaware, and in breadth from east to west it varies from six to ten miles, its area being about 130 square

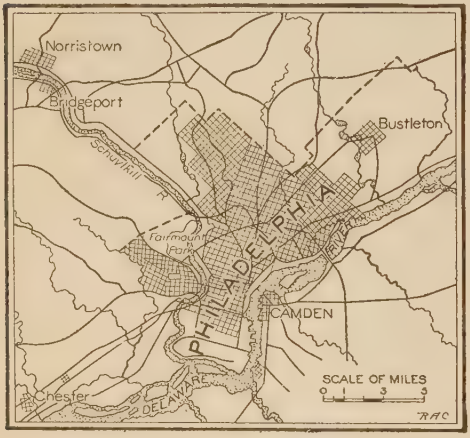
miles. The older part occupies the ground between the Delaware and Schuylkill rivers; it contains the business center and most of the leading industrial establishments. The city is laid out in accordance with a plan devised for the site it was to occupy, and it is one of the best-arranged in the world. The streets run north and south and east and west. Those parallel with the Delaware are numbered and begin with the one nearest the river. Those extending east and west are named. Market Street, the chief business thoroughfare running east and west, divides the city into north and south sides, and Broad Street, the chief north and south thoroughfare, divides the portion between the rivers into east and west sides. These two streets intersect at the city hall. That part of the city beyond the Schuylkill is known as West Philadelphia. The buildings are numbered in accordance with the streets, each block beginning with a new hundred, so from the number and the letters indicating north and south, east and west, one can tell at once the location of any building. In the older part of the city the streets are quite narrow, and in a few of them street cars can run in only one direction; but the residential sections and the newer parts of the city have wider thoroughfares. Most of the streets are paved with brick, stone or asphalt, or are macadamized.

Parks. The park system began with the original plan of the city in the establishment of numerous small parks, known as *squares*. These are distributed throughout the more densely populated sections, and many of them are noteworthy for the beauty of their trees, shrubbery and statuary. On the south side of the city is League Island Park, of 300 acres, adjoining the navy yard, which is on an island of the same name. To the east of this is Point Breeze Park, and some blocks north of this is Girard Park, which occupies about four squares. In the heart of the city are found Jefferson Square, Rittenhouse Square, which is in the center of the best residential section; Washington Square, Independence Square, Franklin Square, and Logan Square; but by far the most important of the city's pleasure grounds is Fairmount Park, containing nearly 3,000 acres. This is located on the west side of the city and is divided by the Schuylkill into East Park and West Park. Another portion, extending along the Wissahickon is known as the Wissahickon Valley. This is a deep ravine which has been preserved almost in its natural state.

Fairmount Park contains many objects of historic interest. Among these is the cottage of William Penn, the first brick building erected in Philadelphia, which has been transferred from its original site, on Letitia Street, near the river. On Lemon Hill is the house in which Robert Morris lived during the Revolutionary War. At the Green Street entrance of the park is the Washington Monument, which was erected by the Society of the Cincinnati at a cost of $250,000. There are also a number of statues of noted men, including those of Goethe, Schiller, Columbus, Lincoln, Grant, Meade and Garfield. This park contains many miles of drives and boulevards and over ten miles of bridle paths. In the southern portion of the West Park was located the Centennial Exposition held in 1876. Two of the original buildings, Horticultural Hall and Memorial Hall, still remain. The former contains a fine collection of tropical plants, and the latter is now an art gallery and museum. Adjoining this part of the park on the south is a zoölogical garden, which contains one of the finest collections of animals in America.

Buildings. Philadelphia contains a number of buildings of historic interest, and these have been carefully preserved. Carpenter's Hall, on Chestnut Street, between Third and Fourth, is a plain two-story brick structure, in which the First Continental Congress met in 1774. Independence Hall, around which cluster the most interesting associations, is on Chestnut, between Fifth and Sixth streets. It contains many of the articles of furniture used by the old Congress and by the Constitutional Convention, as well as the old Liberty Bell which was rung at the passage of the Declaration of Independence. The Betsy Ross house, on Arch Street above Second, is the house in which the first American flag was made. The old London Coffee House, which in Revolutionary times was frequented by the leading men of the city and nation, stands on the corner of Front and Market streets. The Girard National Bank was originally built for the first United States Bank, and Christ's Church, on Second and Market streets, begun in 1695, is one of the oldest buildings in the city. In historic buildings Philadelphia equals Boston.

First among the modern buildings, in importance and interest, is the city hall, usually known by Philadelphians as the "public building." This structure occupies nearly all of the square at the intersection of Market and Broad streets. It is 486 feet by 470 feet, is constructed of marble, has a height of ninety feet, with corner pavilions rising to 161 feet, central pavilions to 203 feet, and a tower surmounted by a colossal statue of Penn thirty-seven feet high, the top of which is 548 feet from the ground. This building is occupied by the county and city offices, and has cost, including erection and furnishings, nearly $25,000,000. The tower contains a clock with dials thirty feet in diameter. Next in importance are the Federal



buildings, including the new United States mint, on Spring Garden Street; the post-office, which occupies the site of the first President's mansion, on Market and Chestnut, between Ninth and Tenth; the custom-house, near the river, and the arsenal, on the south side of the city, near the Schuylkill.

Other buildings, worthy of note because of their architecture, are the Masonic Temple, the Odd Fellows' Hall, the Young Men's Christian Association building, the Arcade building, the Betz building, the Commonwealth Trust building, the Drexel building and the terminal stations of the Pennsylvania and the Reading railroads. The Bourse building is the home of the Board of Trade, and contains a large commercial museum. Among the churches, the most important are the Roman Catholic Cathedral, the largest church in the city; the Arch Street Methodist Episcopal, the Holy Trinity, the Friends' Meeting House, on Arch Street, and the First Presbyterian. Some of America's greatest hotels are in the city.

Institutions. Chief among the educational institutions is the University of Pennsylvania, occupying a beautiful site west of the Schuylkill and south of Market Street. Next in importance is Girard College, in the northern part of the city. This is one of the most heavily-endowed educational institutions in America. The Drexel Institute has attained a wide reputation as an industrial school. Besides these there are many other colleges and secondary schools maintained by different religious organizations. Bryn Mawr College, a famous college for women, is located a few miles from the city. In the line of scientific education should be mentioned the Academy of Natural Sciences and the Franklin Institute.

Philadelphia is well supplied with libraries. That of the Library Company, which is the public library, has over 250,000 volumes, and maintains, besides the central library, fourteen branches in different parts of the city. The University of Pennsylvania, Girard College, Drexel Institute and other institutes also have large libraries. Among the institutions of a charitable nature are the hospitals for the insane, the general and the municipal hospitals and the Pennsylvania Hospital, founded in 1751, at the instigation of Benjamin Franklin. In addition to these are numerous charitable institutions maintained by the different religious denominations of the city.

Commerce and Industry. Philadelphia is one of the great industrial centers of the country, being exceeded only by New York and Chicago in this respect. It holds first, second or third place in the Union in the manufacture of steam locomotives, street railway cars, iron and steel goods, carpets and rugs, foundry products, refined sugar and petroleum, worsteds, chemicals, cordage and fertilizers, and it outranks all other cities in value of total production of textiles. The city is also a great center of printing and publishing, and is the headquarters of the mammoth Curtis Company interests. Among its great industrial establishments are the Baldwin Locomotive Works, the largest of the kind in the world, and shipyards in which are built some of the largest and best ships made in the United States.

Questions on Philadelphia

An outline suitable for the study of a city the size of Philadelphia will be found with the article CITY.

What historic documents had their creation in Philadelphia?

What do the following names stand for: Independence Hall; Liberty Bell; Betsy Ross?

What is the meaning of the word *Philadelphia?* Why was it an appropriate name when the city was founded?

Describe the street system of Philadelphia.

What great exposition was held in 1876 in Fairmount Park? What was its significance?

Name the chief educational institutions in and near the city?

In what manufactures does Philadelphia take a leading place?

Who planted the first settlement on the site of the city?

What two groups of people affected the early character of the place?

For what achievements is Benjamin Franklin noted?

Why did New York forge ahead of Philadelphia as a commercial port?

What is the city's rank in population in the United States?

The Delaware admits the largest ocean steamers, and Philadelphia has an extensive foreign commerce. The city is also an important receiving and distributing center for those portions of the country reached by the divisions of the Pennsylvania, the Baltimore & Ohio and the Philadelphia & Reading railroads.

History. The first settlement was made in 1636 by Swedes, and was named Wicaco. The first English settlement was made in 1681 under Captain William Markham, who came to the country as deputy governor under William Penn. The colony grew rapidly, and within four years it had over 2,500 inhabitants, most of whom were Quakers. A few Germans also settled in Germantown, now within the city limits, and the influence of these two classes affected the life of the town for many years. The city was chartered in 1701. During the Revolutionary period Philadelphia was the center of political activity, and was the capital of the colonies. It was occupied by the British for nearly a year, from September, 1777, to June, 1778. Conspicuous among the notable men of this period was Benjamin Franklin. From 1755 until near the middle of the nineteenth century it was the chief city in wealth, commerce and culture in the country, but with the completion of the Erie Canal, in 1825, New York received advantages that attracted to its harbors much of the commerce that formerly came to Philadelphia. In 1854 the city was extended to the limits of Philadelphia County, and eleven villages were annexed. The Centennial Exposition of 1876, in commemoration of the hundredth anniversary of the signing of the Declaration of Independence, and celebrations in honor of the founding of the city are milestones of its later history.

Related Articles. Consult the following titles for additional information:
Centennial Exposition
Delaware (river)
Drexel Institute
Franklin, Benjamin
Girard College
Independence Hall
Liberty Bell
Penn, William
Pennsylvania, University of
Ross, Betsy

PHILAE, *fi'le,* a small uninhabited island in the Nile, on the borders of Nubia and Egypt, just above the first cataract and about five miles south of Assuan. It contains some of the most remarkable ruins in Egypt, including obelisks, temples and monuments. The most ancient of the temples was erected by Nectanebo II, about four centuries B. C. There is an imposing temple to Isis, to whom the island was especially sacred. The great dam, a short distance below Philae, threatens the extinction of the ruins; in fact, during several months of the year only the tops of the ruins are discernible above the inundation.

PHILEMON. See BAUCIS AND PHILEMON.

PHILIP, *fil'ip,* of Bethsaida, one of the Twelve Apostles. Later he and Andrew carried a message of the Greeks to Jesus, and these two alone of the disciples were present at the feeding of the five thousand. Philip seems to have been of an inquiring mind, and, though lacking deep spiritual insight, was loyal to duty and zealous in the Master's cause.

PHILIP, the Evangelist, often confounded with Philip, the apostle, is first mentioned in *Acts* VI, 5. He preached at Smyrna, where Simon Magus was one of his converts; he baptized the Ethiopian eunuch, and he en-

tertained Paul and his companion on their way to Jerusalem. Philip's four daughters are said to have had the gift of prophecy.

PHILIP IV, (1268–1314), king of France, succeeded his father, Philip III, in 1785. Because of his physical beauty he was called PHILIP THE FAIR. His marriage to Jeanne of Navarre added Navarre and Champaign to his domain; war with Flanders resulted in the accession of the Walloon territory to France. One of the chief events of Philip's reign was his struggle with the Papacy. In this he convoked the first States-General. The Pope was seized and imprisoned, his office was filled by an adherent of the king and the papal residence was changed to Avignon, which remained the seat of the Papacy for seventy years. It was a part of Philip's policy to overtax the Jews and Lollards and debase the coinage. His cruel rule in Flanders resulted in revolt; in 1302 he was defeated at the Battle of Courtrai, and his ascendancy in that country came to an end.

PHILIP VI (1293–1350), king of France, the first of the dynasty of Valois. He succeeded his cousin Charles IV in 1328, and came at once into conflict with Edward III of England, who claimed the French throne as grandson of Philip IV. After defeating the Flemings at Cassel in 1332, Philip undertook a crusade. In 1337 began the Hundred Years' War with England. Taxation for wars and for the king's colossal extravagance reduced the people to pauperism, and in the later years of Philip's reign a terrible pestilence, known as the "black death," swept over the country. See FRANCE, subhead *History*.

PHILIP II (1527-1598), king of Spain, whose reign marked the beginning of Spain's decline. He was the son of Emperor Charles V and Isabella of Portugal, and succeeded his father as king of Spain in 1556. His first wife was Maria of Portugal; his second, Mary, queen of England. Philip believed religious unity to be indispensable to the peace of the state, and he began his reign with the narrow policy of stamping out all opposition to the Roman Catholic faith. This policy accomplished Spain's ruin. It antagonized the Netherland provinces, his most valuable possession, and they revolted, ultimately becoming independent; it made enemies of France and England, which sympathized with the Flemings and Hollanders; it caused trouble among some of his best subjects at home, the Moriscos.

In Philip's reign the Inquisition reached its height, and he is believed to have had a hand in the Massacre of Saint Bartholomew. In his reign the "Invincible" *Armada* was destroyed, and Spain lost its supremacy at sea to England Turkey and Portugal were subdued, but only temporarily. After Mary's death Philip married Elizabeth, daughter of Henry II of France, and when she died he espoused Anna, daughter of Maxmilian II. Toward the close of his life he concluded with France the Treaty of Vervins and attempted treaties with England and the Netherlands, but his overtures were not encouraged.

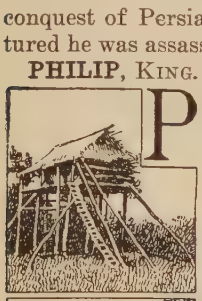
PHILIP II

PHILIP V (1683-1746), king of Spain, the first Spanish king of the Bourbon dynasty. He was the son of the Dauphin Louis and Maria Ann of Bavaria and grandson of Louis XIV and Maria Theresa, sister of Charles II. He succeeded to the Spanish throne by the will of Charles II, who died without issue, and was proclaimed king in 1700. The rival claims of Archduke Charles of Austria led to the War of the Spanish Succession, in which France and Spain were allied against England, Austria, Denmark, Prussia, Portugal, Hanover and Savoy. By the Treaty of Utrecht, in 1713, Philip was recognized as king of Spain, but at the cost of Gibraltar, Sicily, the Netherlands and Naples. In 1714 Philip married Elizabeth Farnese, an ambitious woman, whose scheming involved him in difficulties he was too weak mentally to cope with. In 1724 Philip abdicated the crown in favor of his son Louis, but on the death of Louis a few months later, he resumed the royal power. The War of the Austrian Succession occured in the later part of his reign. In his last years Philip was hopelessly feeble-minded.

PHILIP II (382-336 B. C.), king of Macedonia, son of Amyntas II and father of Alexander the Great (which see). He was born at Pella, and in his youth had for teachers Epaminondas and Pelopidas, the two leading Greek scholars of the day. After a short regency for the infant heir, his nephew, he made

himself king in 360 B. C. He secured his position by disposing of the rival claimants, defeating the Illyrians and diplomatically treating with the Athenians. Aiming to make himself master of Greece, he captured one after another the towns on his border. His success as an ally of the Thebans gave him a seat in the Amphictyonic Council. Demosthenes, seeing the danger to Athens of Philip's rise to power, endeavored to show his countrymen the necessity of protecting themselves, but his impassioned *Philippics,* in which he advocated a defensive Greek league, were not heeded. By 339 Philip established his supremacy in Thrace, and in the following year he entered Greece with his army, ostensibly as an ally and to subdue the Locrians. At last the Athenians, realizing their danger, formed a league for defense, but it was too late. They were completely defeated by Philip at Charonea in 338, and all Greece came under his sway. Philip planned the conquest of Persia, but before his plans matured he was assassinated.

PHILIP, KING. See KING PHILIP.



PHILIPPINE, *fil'i pin,* or *fil'i peen,* **ISLANDS,** the largest overseas possession of the United States, a group of islands lying south of Japan and directly west of that portion of the Asiatic continent known as French Indo-China. With their acquisition and that of Porto Rico, at the close of the Spanish-American War, the United States became a colonial power with interests in the Far East, and emerged from the "splendid isolation" which had been a fixed policy since the formation of the republic. After twenty years of rule in the Philippines, during which the United States taught an oppressed, backward people the value of education, sanitation and the principles of self-government, the American people had brought before them the question of giving these people their independence. Having fought the World War, in which self-determination became an outstanding issue, they were confronted with the wisdom of applying that principle to their Filipino wards.

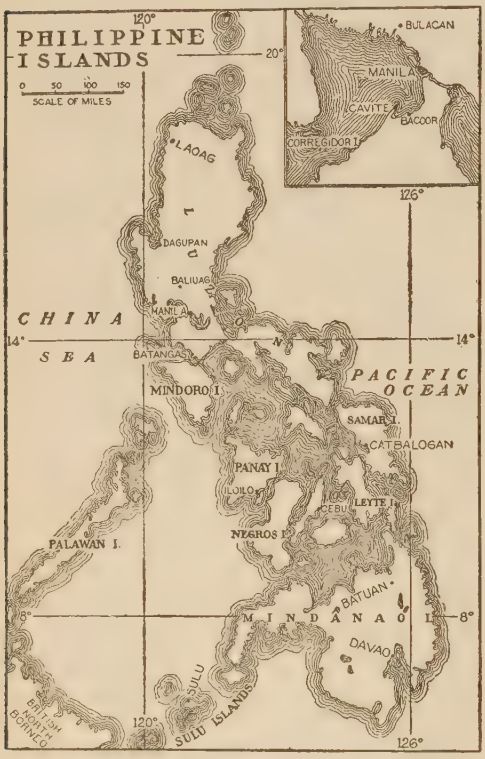
Area and Population. The Philippine archipelago, as bounded by the Treaty of Paris, has a length from north to south of about 1,000 miles and a width from east to west of about 600 miles. The area is 115,000 square miles, or about the same as the combined areas of Nevada and Connecticut. Within this are grouped about 3,100 islands, over 1,600 of which are named. The rest are mere points of land and are designated by number or simply by location. The two largest islands are Luzon (40,814 square miles) and Mindanao (36,906 square miles). Belonging to the group are the Sulu Islands, inhabited by the Moro tribe. The estimated population of the archipelago, including wild tribes, is 9,000,000. There are about 11,000 Americans and Europeans.

Surface and Drainage. The Philippine Islands rest upon an oceanic plateau, which within the archipelago is seldom more than 200 feet beneath the surface. The islands consist of uplifts on this plateau and are mostly of volcanic origin, though coral formations have added somewhat to the original area of the volcanic islands. The large islands are all mountainous. In the main the mountains extend in north and south directions and contain numerous volcanic peaks. About fifty of these are well marked, and of this number over twenty have been active within historic times; a few are now active or quiescent. The highest peak is Mount Apo, in Mindanao, 10,312 feet. On this island and Luzon there are a number of other peaks which exceed 7,000 feet, including Halcon, 8,868 feet, and Mayon, 8,274 feet, both on Luzon. Along the coast of Luzon and Mindanao there are quite extensive tracts of low land, and some of the smaller islands, which are of coral formation, rise only a few feet above the sea. With scarcely an exception the islands are irregular in form, and this gives them a coast line which exceeds that of the United States.

Luzon and Mindanao are the only islands that have rivers of any considerable importance. The chief rivers of Luzon are the Rio Grande de la Pampanga, flowing into Manila Bay; the Cagayan, draining the northern part of the island, and the Pasig, connecting Laguna de Bay with Manila Bay. Though short, this stream is of great commercial importance. The largest river in the islands is the Rio Grande de Mindanao, which drains the north and central parts of Mindanao and flows into Celebes Sea. The islands contain

but few lakes of importance. Of these Laguna de Bay, near Manila, and Laguna de Bombon, also in Luzon, are the best known.

Climate. Although the islands lie wholly within the tropics, their extent from north to south and their variation in altitude give them a great variety of climatic conditions. While they have a hot climate, the heat is not so intense as might be supposed from their latitude. The range of temperature is usually between 60° and 90° for different seasons of



the year, the thermometer seldom falling below the former or rising above the latter point. The year is usually divided into three seasons. The first, extending from the middle of November to the middle of March, is the most agreeable. From the middle of March to the middle of July is the hot, dry season, and from the middle of July to the middle of November is the rainy season, in which the temperature is seldom higher than it is during the winter. That portion of the archipelago north of the tenth parallel of latitude is affected by the trade winds, which begin in April or May and blow for about five months. These are followed by the northeast monsoon, which continues the remainder of the year. The islands are also visited by frequent typhoons, which are the strongest at about the equinoxes. These pass over the islands from west to east and frequently do considerable damage (see TYPHOON). As in other tropical regions unaffected by large mountain ranges, the rainfall is heavy, but it is unevenly distributed throughout the year.

Mineral Resources. The variety and extent of mineral resources are not fully known. Coal similar to that mined in Japan is found quite generally distributed throughout the islands and is mined by the government for use on transports. Gold has been known to exist in Luzon for centuries, and during all of this time placer mines have been worked by the natives; at present it is one of the most important minerals produced, and the annual output is worth about $1,500,000. Lead and manganese are also being worked. There are also large deposits of copper and iron ore in the central and northern parts of Luzon, and it is probable that a systematic survey of the other large islands will lead to the discovery of similar deposits. Petroleum has been found in the island of Panay.

Vegetation. About 80,000 square miles of the islands are covered with forests, which contain many varieties of hard and soft woods common in that part of the world. Among these are found gutta-percha and various species of palms, such as cocoanut, nipa and calamus. The last two are extensively used for building and domestic purposes. This forest area is directly under the control of the bureau of forestry of the Philippine government, which, through authorized agents, prevents wasteful cutting of trees and holds the land so that large areas cannot be obtained by companies seeking to gain a monopoly of the lumber industry. Bamboo, which is of very great value to the natives, is found throughout the islands, and abacá, or Manila "hemp," grows wild in some sections. There are many species of tropical plants, noticeable for their brilliant flowers or for various economic uses.

Animal Life. The islands have over sixty species of mature mammals. Some species of wild cats and civets are found; there are also bats, the most interesting of which is the flying fox, or fruit bat. One species of monkey is found, also a flying lemur. There are rats, squirrels and other small rodents. A native buffalo, called the timarau, is found in the forests of Mindoro. The water buffalo, or carabao, has been domesticated and is

the chief beast of burden, and wild hogs are found in all of the large islands. The islands contain several species of deer, some of which have been domesticated. The domestic animals common to Europe and the United States have been introduced. Among these are a small horse, swine and sheep. Some humped cattle are found in various localities, and the breeds of cattle common in Europe and the United States have been introduced. Of birds, there are nearly 700 species. More than half of these are peculiar to the Philippines. The cockatoo and numerous species noted for their plumage are found. The largest reptiles are the python and the crocodile. Lizards are numerous, and are found in almost endless variety. The inland and coast waters contain numerous species of fish valuable for food, and the pearl oyster exists along the coasts in such numbers as to make fishing for its shell a profitable industry.

Industries. Agriculture is the most important industry of the islands, and the government is slowly educating the people away from their primitive ideas of cultivation. The soil and climate are well adapted to growing nearly all crops of the tropical regions. At present the chief crops are rice, Manila "hemp," maguey, sugar cane, tobacco and cocanut. Coffee was formerly raised, but the crop has become unprofitable, on account of destructive insects. Rice is the largest single crop. The hemp industry has been aided by the introduction of a government system of inspection and grading, and grades of fibers are now standardized.

The manufacture of cigars and cigarettes is the most important manufacturing industry; in Manila are some of the largest tobacco factories in the world. Numerous large modern cocoanut oil factories are in operation in the islands, and central sugar mills of modern type have been established in the chief sugar-producing sections. There are other factories for the production of articles for home consumption, but the principal industries, aside from those mentioned, are those carried on in the homes or in vocational schools, such as weaving, hat and basket making, embroidering and other lines of handicraft. The government aids by conducting a sales agency which supplies materials at cost and provides for the distribution of products at prices favorable to the workers.

Transportation. Until 1905 there was but one railroad in the islands. This extended from Manila northward 120 miles to Dagupan. There are now nearly 800 miles in operation. The work of highway construction has progressed rapidly, and about 7,000 miles of first-class surfaced roads have been built. One of the finest boulevards in the world skirts the shore of Manila Bay for fifteen miles, between Manila and the naval station of Cavite. Another marvel of road building is a mountain highway that leads to Baguio, the summer capital of the islands. Highways and railroads are under government control. All of the larger islands have been connected by telegraph, and Manila is connected with the United States by the American Pacific Cable and with the leading ports of Asia and Europe by other cables. A good postal system, based on that of the United States, is also in operation.

Commerce. The commerce of the islands has never been large, but has increased rapidly since the American occupation. Manila, the chief seaport, has been opened to admit the largest ocean steamers, by the dredging of the bay and the construction of a new dock. Cavite and Dagupan, on Luzon, are also of considerable commercial importance, while Cebu, on the island of Cebu, and Iloilo, on Panay, are the most important ports in the central islands. The exports are hemp, which far exceeds all other articles in value; sugar, tobacco, copra (the dried meat of the cocoanut), and a limited amount of manufactures. The imports consist largely of manufactured goods and foodstuffs. The chief trade is with the United States. The annual imports amount to more than $50,000,000, and the exports reach a total of over $70,000,000. From the tariff on imports and from internal taxes, the revenue for support of the government is derived. The coin in general use is the *peso,* valued at fifty cents in United States money.

Inhabitants and Language. The native people consist of the Negrito tribes, generally considered aborigines, numbering between 20,000 and 30,000, and the Malay tribes, of which there are a large number. The negritos have curly hair and nearly black skin and are short of stature. They dwell in the interior and are still in a state of savagery. In addition to these are the Igorrotes, occupying the central provinces of northern Luzon, a Malay tribe who are still in an uncivilized or partially civilized state. In general the term *Filipino* includes the seven

Christianized tribes, of which the Tagalogs, Visayans, Bicols and Pampangans are the most important. These tribes occupy nearly all of northern Luzon, the central islands and the northern part of Mindanao. Among them are found all grades of culture, from the Barbarian to the college-educated man, but the larger portion of them are civilized. The Moros occupy a large part of Mindanao and the Sulu Archipelago.

There are nearly as many dialects in the islands as there are tribes, and no one dialect or language predominates, even in the island of Luzon; consequently, ever since Spanish occupation it has been necessary to use a foreign language as the official language of the islands. This was naturally Spanish until after the American occupation, but on January 1, 1911, English became the official language of the government and the courts. The Tagalog, or Tagal, and Visayan dialects are the most fully developed of the native tongues, and these have reached such a stage of completion as to lead to the development of a limited native literature.

The people generally live in villages or cities, and are retiring and simple in their habits. They have the lethargy common to native people of tropical climates; yet, when sufficient inducement is offered, they have proved willing and efficient workers. Little dress is needed to protect them from the elements, hence their attire is scanty. Their houses are constructed of bamboo; the floors are built about five feet from the ground, and the roofs are covered with nipa or some other form of thatch. Their culinary utensils and articles of furniture are of the simplest sort.

By far the larger part of the civilized Filipinos are followers of the Roman Catholic faith. The Moros, as the name indicates, are Mohammedans. The uncivilized tribes practice various religious rites of a heathen nature. There are, however, natives who are followers of the leading Protestant denominations, but these have as yet few followers.

Government. According to an act of Congress passed on August 29, 1916 (the Jones Bill), the islands have a considerable degree of self-government. The chief executive is a governor-general; the other executive officers are a vice-governor, who is also secretary of the department of public instruction, an auditor and a deputy auditor, all appointed by the President of the United States, with the concurrence of the Senate.

The legislative assembly consists of a senate and a house of representatives, the members of which are elected for terms of six and three years, respectively. Two resident commissioners to the United States are elected by the legislature. There are six executive departments, all of which are headed by Filipinos, except the department of public instruction.

The islands are divided into thirty-seven provinces, besides the recently-created department of Mindanao and Sulu, which comprises seven provinces. There are regular and special provinces. The former, thirty-two in number, have in each case as the governing board a governor and two members, all elected by popular vote. The governors of the special provinces, with the exception of one elected by popular vote, are appointed by the governor-general, the appointment being ratified by the Philippine senate. Town officials are elected by the people of each municipality.

The courts have been reconstructed on the American plan, and consist of a supreme court, with one chief justice, who is a native Filipino, and eight associate justices, and a series of courts of first instance, presided over by native justices, besides municipal courts and courts of the justices of the peace. The courts of first instance are courts of record and have original jurisdiction in cases considered too important to be tried in the municipal or justice courts.

Education. The islands have been divided into forty-four divisions for purposes of instruction, and there are about 700,000 pupils enrolled in the public schools. English is taught in all of these schools, which number about 4,800. There are over 11,000 native teachers. For higher education there is maintained at Manila the University of the Philippines, supported by the government. There are, besides, over 200 private schools.

Cities. The chief cities are Manila, the capital: Cavite, Batangass, Iloilo and Cebu.

History. Magellan discovered the islands in 1521 and lost his life battling with the natives. After several ineffectual attempts at settlement by the Spaniards, the first colony was established in 1565 on the island of Cebu. From this foothold the Spaniards proceeded to occupy one island after another, until they had obtained control of nearly the entire archipelago. The occupation was followed by the work of the religious orders, who established

missions among the natives and used every effort to convert them to Christianity. During the seventeenth century the islands suffered somewhat from the war between the Dutch and the Spanish, and in 1662 they were raided by Chinese pirates. Following this, for a period of a century the islands were left without disturbance. Because the main object of the occupation was to Christianize the inhabitants, and also because of opposition of Spanish merchants, no attempt was made to exploit the islands or in any way to develop their commerce. In the Seven Years' War the islands were captured by the British, but they were retroceded to Spain by the Treaty of Paris, in 1763. They then remained under Spain's control until the outbreak of the Spanish-American War in 1898, when the Spanish fleet was destroyed by the American squadron under Commodore Dewey on May 1. On August 13 Manila was captured and the islands came under American occupation. By the Treaty of Paris, which closed this war, the Philippines were ceded to the United States, on the payment to Spain of $20,000,000.

Previous to the outbreak of the Spanish-American War, there had been an insurrection in the islands, under the leadership of Emilio Aguinaldo and others. While the insurrection had been quelled by the Spanish authorities, the captain-general decided that the best means of pacifying the malcontents was to pay the leaders a large sum, on agreement that they should leave the islands, never to return. About one-half of this amount, $200,000, was paid to Aguinaldo and some others, who departed for Hong-kong. However, when the war broke out, Aguinaldo returned to Manila, and a short time after he proclaimed the Filipino Republic.

Aguinaldo and his troops assisted the American army in the investment of Manila and contributed no small part towards the capture of the city. He claimed that he had obtained from Dewey and certain American consuls a promise that the United States would hold the Philippines until an independent government could be established, treating these islands in the same way that Cuba was treated. These officers, however, denied that any such promise had been made, and when the islands were ceded to the United States, Aguinaldo instituted a revolt against American authority. This brought on a war which, beginning in 1899, lasted for more than two years; it is generally known as the Filipino Insurrection. In January, 1899, President McKinley sent the first commission to the islands to learn the state of affairs and to try to pacify the leading Filipinos and secure their allegiance to the government.

In 1900, a Philippine Commission, with Hon. William H. Taft at its head, was appointed, and in July, 1901, this commission established civil government throughout the islands, and Judge Taft became civil governor. In 1902 arrangements were completed by Taft for the purchase of the lands owned by the Catholic friars who had been forced to flee from the islands, and in the next year a census was taken. During the administration of James T. Smith, the first Philippine Assembly was opened on July 30, 1907. Under W. Cameron Forbes, governor from 1909 to 1913, great progress was made, especially in the matters of health and education. For the remarkable advances made in the improvement of health conditions and in the elimination of small-pox and other epidemic diseases the chief credit must go to Dr. Victor G. Heiser, the director of health.

In 1913 Francis Burton Harrison was appointed governor-general by President Wilson. The administration, in the words of the President, was pledged to secure "the ultimate independence of the islands." The Jones Bill, providing for the present form of government, showed that the administration was sincere in its promises, and after a few years of modified home rule the Filipinos declared themselves ready for independence. When the United States entered the World War the people of the islands offered an armed and equipped division to the government, gave it a submarine destroyer and generously subscribed for Liberty Bonds and to the Red Cross funds. After the peace conference in Paris assembled a native mission visited the United States bearing documents in proof of the ability of the Filipinos to establish a stable, independent government. President Wilson expressed himself as fully in sympathy with the idea, but there was a feeling among some well-informed officials that the time for granting independence was not ripe.

Related Articles. Consult the following titles for additional information:

Aguinaldo, Emilio
Batangas
Cavite
Cebu
Iloilo
Manila
Spanish-American War
Taft, William H.
Travels in Distant Lands

PHILISTINES, *fil lis'tinz*, a mixed people who in Biblical times inhabited the western coast of Palestine. Their five chief cities, Gaza, Gath, Ashdod, Ashkelon and Ekron, formed a sort of confederation, under five lords, or chiefs. The Philistines are frequently mentioned in the Bible as enemies whom the Israelites constantly feared, and whom they ultimately conquered under the leadership of David. The giant Goliath and Delilah, who betrayed Samson, were both Philistines.

PHILLIPS, WENDELL (1811-1884), an American orator and reformer, was born at Boston, Mass. He was graduated from Harvard College in 1831, and was admitted to the bar in 1834. However, the question of the abolition of slavery so absorbed his attention that he deserted his profession to champion that cause. A speech in Faneuil Hall, in 1837, against the murderers of Lovejoy, at Alton, Ill., made him at once the principal orator of the anti-slavery party; and thereafter, until Lincoln's Emancipation Proclamation, he was a leader in the struggle.

WENDELL PHILLIPS

He also championed the cause of temperance, of women's rights, of the Indians, of prison reform and of labor. In 1870 he was nominated for governor by the Prohibitionists and the labor party. He was long a conspicuous lyceum lecturer, and his wit, use of epigram and invective, as well as apt illustration, place him in first rank among American orators. His addresses on *Toussaint l'Ouverture*, *The Lost Arts* and *The Scholar in a Republic* are notable examples of his power.

PHILOLOGY *fil ol'o jy*, or **COMPARATIVE PHILOLOGY**, terms commonly used to mean the science of language, otherwise called *Linguistic Science*, or *Linguistics*. This science treats of languages as a whole, of its nature and origin, and of the different languages of the world in their general features, attempting to classify and arrange them and to settle in what relationship each stands to the others. That every language has a life and growth is true in a sense, for languages are continually in a state of change.

What is Language? A language is a system of vocal sounds, through which ideas are conveyed from person to person, in virtue of the fact that certain ideas are attached to, or belong to, certain sounds by a sort of general understanding existing among those who use the language. That there is any natural law by which one idea belongs to one vocal sound rather than to another can hardly be affirmed, in view of the fact that if we select any one idea, we shall find that each of the thousand languages of the world expresses this idea by a different sound or group of sounds. Indeed, ideas can be conveyed otherwise than by vocal sounds, as witness the elaborate sign language that has been developed in some communities and the finger language of the deaf and dumb.

Origin of Languages. As to the origin of language, nothing is really known. We suppose that the earliest men had no language, but having suitable organs for speech they devised a language among themselves as a means of intercommunication. We may conclude that the earliest attempts at speech were either in imitation of the different sounds heard in nature or that they were based on the inarticulate utterances or cries by which human beings naturally gave vent to different emotions. However language originally arose, it is very certain that whatever language we speak has to be acquired from others who have already learned to speak it, and that those others have similarly acquired it from their predecessors, and so on backward into the darkness of the remotest ages. Every language is thus at our birth a foreign language to all of us.

The science of philology is of modern origin, being hardly, if at all, older than the nineteenth century. Already most valuable results have been attained and a large number of languages have been studied and classified; yet much remains to be done, and much remains uncertain and must always remain so.

One great difficulty that the philologist has to grapple with is that only a very few tongues possess a literature dating from before the Christian Era and that the greater number have no literature at all.

Teutonic Group. Philology has succeeded in showing that the English language is one of a group of closely allied languages, which are known by the general name of the Teu-

tonic, or Germanic, tongues. The other languages of the group, some of which are more closely connected with English than the rest, are Dutch, German, Danish, Icelandic, or Old Norse, Swedish and Gothic; to these may be added, as of less importance and having more of the character or dialects, Norwegian, Frisian, Plattdeutsch, or Low German of northern Germany, and Flemish, which differs little from Dutch. The Teutonic tongues are often divided into three sections, based on closeness of relationship—the High German, of which the modern classical German is the representative; the Low German, including English, Dutch, Frisian, Plattdeutsch and Gothic, and the Scandinavian, including Danish, Swedish and Icelandic. Another division is into East Germanic, including Gothic and Scandinavian, and West Germanic, including the others.

The evidence that all these languages are closely akin is to be found in the great number of words that they possess in common, in the similarity of their structure, their inflections, their manner of compounding words —in short, in their family likeness. This likeness can be accounted for only by supposing that these languages are all descended from one common language, the primitive Teutonic, which must have been spoken at a remote period by the ancestors of the present Teutonic peoples, there being then only one Teutonic people as well as one Teutonic tongue. In their earliest form and when they began to be differentiated, these languages must have had the character of mere dialects, and it is only in so far as each has had a history and literature of its own that they have attained the rank of independent languages.

The rise of dialects is a well-known phenomenon, taking its origin in the perpetual change to which all languages are subject. A language that comes to be spoken over a considerable area and by a considerable number of persons—especially when not yet firmly fixed by writing and literature—is sure to develop dialects, and each of these may in course of time become unintelligible to the persons using the others, if the respective speakers have little intercourse with each other. In this way is the existence of the different Teutonic tongues to be accounted for. A similar instance of several languages arising from one language is seen in the case of Italian, French, Spanish and Portuguese, all of which are descended from the Latin. Of the common origin of these, we have, of course, direct and abundant evidence.

Aryan Group. The Teutonic tongues, with the primitive or parent Teutonic, from which they are descended, have been proved to belong to a wider group or family of tongues, which has received the name of Aryan, Indo-European, or (especially in Germany) Indo-Germanic family. The chief members of this family are the Teutonic; Slavonic (Polish, Russian, Lithuanian); Celtic (Welsh, Irish, Gaelic); Italic, or Latin; Hellenic, or Greek; Indic, or Sanskrit; Iranic, or Persian, and Anatolic, or Armenian. Just as the Teutonic tongues are believed to be the offspring of one parent Teutonic tongue, so this parent Teutonic and the other members of the Aryan family are all believed to be descended from one primitive language the Aryan, or Indo-European, parent speech. The people who spoke this primeval Aryan language, the ancestors (linguistically at least) of the Aryan races of Europe and Asia, are believed by many to have had their seat in central Asia, to the eastward of the southern extremity of the Caspian Sea. This, however, is very problematical, and some philologists see reason to think that Europe may have been the original home of the Aryans. This latter view is now perhaps the one most generally held.

How remote the period may have been when the ancestors of the Teutons, the Celts, the Slavs, the Greeks, the Romans, the Persians and the Hindus were living together and speaking a common language, is uncertain. Yet the general character of their language is approximately known, and philologists tell us with some confidence what consonant and what vowel sounds the Aryan parent speech must have possessed, what were the forms of its inflections, and what, at the least, must have been the extent of its vocabulary, judging from the words that can still be traced as forming a common possession of the sister tongues of the family.

Semitic Group. The Aryan tongues, ancient and modern, are entitled to claim the first rank among the languages of the globe, as to richness, harmony and variety, and especially as embodying a series of literature to which no other family of tongues can show a parallel. Next in importance come the Semitic tongues—Hebrew, Chaldee, Syriac, Arabic and their related tongues. These, like

the Aryan tongues, form a well-marked family, one notable peculiarity of which is the possession of "triliteral" roots, or roots of which three consonants form the basis and give the general meaning, while inflection or modification of meaning is indicated by internal vowel-change. Thus the vowels play a subordinate part to the consonants and do not, as in the Aryan tongues, associate with them on equal terms.

Other Languages. Other important linguistic families are the Hamitic, which includes ancient Egyptian, Coptic, Berber and Ethiopian; the Turanian, or Scythian, which includes Turkish, Finnish and Mongolian, and the Southeastern Asiatic, which includes Chinese and Siamese. Other families of languages are the Malayo-Polynesian, of the Indian Archipelago and the Pacific; the Bântu, a great family of South Africa, and the American Indian languages, which are characterized as polysynthetic from the way in which they crowd as many ideas as possible into one unwieldy expression. All these families form groups, so far as is known, separate from and independent of each other; and attempts to connect any two of them, as Aryan and Semitic, for instance, have met with little success.

Related Articles. Consult the following titles for additional information:

Alphabet
Americanisms
Aramaic
Chaldee Language
Consonant
Cufic
Cuneiform Inscriptions
Dialect
Diphthong
English Language
Esperanto
Etymology
French Language
German Language
Greek Language
Hebrew Language and Literature
Hieroglyphics
Iranian Languages
Italian Languages
Languages of the World
Latin Language
Plattdeutsch
Provençal Language and Literature
Romance Languages
Rosetta Stone
Runes
Sanskrit Language and Literature
Semitic Language
Sign Language
Syriac
Visible Speech
Volapük
Vowel
Writing

PHILOMELA, *fil o me'la*, in Greek mythology, daughter of Pandion, king of Athens. Her sister Procne was the wife of Tereus, king of Thrace, and they had one son, named Itys. Tereus, growing tired of his wife, imprisoned her, and he cut out her tongue so that she could tell no one. Then pretending his wife was dead, he married Philomela. But Procne made known her wrongs to her sister by embroidering her story in tapestry. Then the two, in revenge, murdered Itys and offered him to his father as food. This act so angered the gods that they changed Philomela into a nightingale and Procne into a swallow and they were thenceforth pursued by Tereus, who was changed into a hawk.

PHILOSOPHER'S STONE. See ALCHEMY.

PHILOSOPHY, *fil os' o fy*, from two Greek words meaning *love of wisdom*, is a term having a number of definitions. In general it signifies the body of highest truth. Philosophy has also been defined as "the science of things divine and human, and the causes in which they are contained." Among the ancient Greeks philosophy meant general culture, because it included all knowledge. With the advance of knowledge a more definite and complete classification became necessary, and much that was formerly considered belonging to philosophy is now covered by such sciences as physics, ethics, logic, psychology and metaphysics, so that it is now somewhat difficult to draw a dividing line between philosophy and these sciences. Philosophy has been called "the mother of the sciences" and "the science of sciences;" and these definitions are not far-fetched, for philosophy is really the study of all sciences, considering the relation of each to all the others. Herbert Spencer has defined philosophy as "a system of completely united knowledge."

The Early Period. So far as known the early Greeks were the first to give philosophy a definite meaning; their first philosopher of whom there is any record was Thales, who founded the Ionic school, 600 B. C. Socrates was a moral philosopher, and his teaching led to the founding of a number of schools of Greek thought, among them being the cynic which was a forerunner of the *stoic* and the *Epicurean* schools. Aristotle organized the sciences on an ideal basis, and Plato constructed a complete system of idealistic philosophy. The influence of these great teachers has affected the trend of thought to the present time.

The Romans borrowed their philosophy from the Greeks. Their *eclectic system*, represented by Cicero, was a combination of parts of the various Greek schools. Its chief influence consists in the handing down a name which through the centuries has been applied more or less loosely to various systems of science and to schools of art and learning.

The Middle Period. Other nations besides the Greeks and Romans shared their philosophy, but the Greek thought determined the

philosophy of the Middle Ages, which produced the system known as Scholasticism. Its chief characteristic was its application of Aristotle's logic to the basic doctrines of the Church. Abelard, Anselm, Duns Scotus and Saint Thomas Aquinas were the most noted advocates and teachers of the system.

The Modern Period. The philosophy of the middle period imperceptibly blends with the new philosophy of Bacon and Descartes, who are considered the founders. Bacon, following the plan of Aristotle, reasoned from known facts to general truths and principles. He was the founder of *inductive philosophy,* which since its acceptance has been in general use in scientific research. Descartes, on the other hand, reasoned from the general truths formulated in the mind to individual truths and facts. He was the originator of the famous expression, "I think, therefore I am." Descartes founded the *deductive system* and his method of teaching is in general use in higher mathematics and in some other high school and college subjects. These systems are direct opposites. Bacon believed in reasoning from the known to the unknown; Descartes in reasoning from the unknown to the known. Both have their points of advantage and their limitations. The inductive method may be considered the method of discovering truth; the deductive, that of applying knowledge. Their happy combination lies at the foundation of the great educational systems of the present day.

Later thinkers have done but little, except to elaborate or modify the systems of their predecessors. The utilitarian school headed by John Stuart Mill and the Transcendental school, founded in the United States by Emerson and his followers, are among the most widely-known philosophic systems of recent times. Among the most distinguished philosophers of recent years are Herbert Spencer, Charles Darwin, John Stuart Mill, Locke and Hume in England; Cousin, Voltaire and Bergson in France; Hegel, Kant, Herbart, Lotze, Nietzsche and Schopenhauer in Germany, and William James in the United States.

Related Articles. Consult the following titles for additional information:

GENERAL

Agnosticism
Altruism
Asceticism
Deduction
Deductive Method
Esthetics
Ethics
Fatalism
Induction
Inductive Method
Logic
Materialism
Metaphysics
Mysticism
Optimism
Pantheism
Peripatetic School of Philosophy
Pessimism
Psychology
Rationalism
Scholasticism
Sophists
Stoicism
Transcendentalism
Transmigration of the Soul
Utilitarianism

PHILOSOPHERS

Abelard, Pierre
Aristotle
Aurelius, Marcus
Bacon, Francis
Bacon, Roger
Bergson, Henri L.
Comte, Isidore Auguste
Darwin, Charles R.
Descartes, René
Diogenes
Emerson, Ralph Waldo
Epictetus
Epicurus
Fichte, Johann Gottlieb
Hegel, Georg W. F.
Herbart, Johann F.
Hume, David
Hypatia
James, William
Kant, Immanuel
Leibnitz, Baron von
Locke, John
Mill, James
Mill, John Stuart
Newton, Sir Isaac
Nietzsche, Frederick
Plato
Pythagoras
Schopenhauer, Arthur
Seneca, Lucius Annaeus
Socrates
Spencer, Herbert
Spinoza, Baruch
Thales
Voltaire
Zeno

PHLOX, *flox,* a group of dainty flowering plants, natives of North America. The name, derived from a Greek word meaning *to burn,* is apropos of the flaming purple and crimson blossoms of some wild species which sprinkle the meadows in spring and early summer. Phlox are among the most satisfactory of all garden plants. They are hardy, they bloom in profuse clusters and are remarkable for purity and transparency of color. *Drummond's phlox,* a native of Texas, is the parent of most cultivated varieties of small phlox. The blossoms derived from this source display a wonderful range of color, white, pink, magenta, lilac, purple and red. Florists have succeeded in producing several varieties of giant phlox which grow to a height of six or seven feet.

PHOEBE, *fe'be,* or **PEWEE,** a little olive-

PHOEBE

green bird of the tyrant flycatcher family, very common in America and named from its

call. It builds its compact little nest under bridges, on the beams, very near the water. It is a well-constructed nest of mud and moss, lined with cotton or some other soft substance. Two broods are raised in a season, and when summer is over the birds migrate to the South. See KINGBIRD; WOOD PEWEE.

PHOENICIA, *fe nish'i a*, a part of the Canaan of the Old Testament, was a narrow country bordering the eastern coast of the Mediterranean Sea and extending from Mount Carmel northward to the Eleutheros, a distance of 200 miles. On the east the mountains of Lebanon separated it from the country beyond. Phoenicia was the first great commercial power known to history, and one of the important nations of antiquity. Its beginnings are unknown, but as early as 1500 B. C. it was a nation with a long history. The Phoenicians were of Semitic origin and were related to the Israelites, with whom they were almost constantly at war until the reign of David. In the Old Testament they are also called *Sidonians*.

Their greatest contribution to civilization was the alphabet, which they are credited with inventing. They also were noted for their knowledge of the art of writing, for their skill in mining, in building and in casting metals, and for their manufacture of glass, of cloth and of purple dyes. Like the people of most commercial cities, they were lovers of peace and fond of luxury. Their religion resembled that of the Assyrians, but was even more cruel and debasing. Their chief deities were Astarte, the moon-goddess or goddess of love, and Baal, the sun-god, to whom it was customary to sacrifice every first-born child. They were never united under one ruler, but each city was a sovereignty in itself. Their literature seems to have been very scanty, consisting chiefly of annals, and it has been almost entirely lost. About 1000 B. C. the Phoenicians planted a trading settlement at Cyprus. After Cyprus, the southern coast of Asia Minor, the islands of the Aegean Sea, the northern coast of Africa, southern Spain, Sicily and Sardinia were colonized by them. Not only did they carry on a brisk trade with these colonies, but they became the carriers of merchandise between all the markets of the world. Their vessels carried tin from England; gold, pearls and frankincense from Arabia; silver from Spain; slaves, ivory and panthers' skins from Africa; linen from Egypt; copper from Cyprus; purple from Tyre, and cunningly wrought silver and brazen vessels from Sidon.

The principal cities were Tyre and Sidon, the former noted as the center from which Phoenician colonization proceeded, and the latter for its harbor and commerce. Carthage, for many years the rival of Rome, was the most important colony. Although the Phoenicians became subject to other nations after 850 B. C., they maintained their commercial independence until their conquest by Alexander, 332 B. C.

Related Articles. Consult the following titles for additional information:

Alphabet	Carthage	Syria
Beirut	Sidon	Tyre

PHOENIX, *fe'niks*, a fabulous bird, held sacred by the ancient Egyptians. It was said to be the size of an eagle, and to have red and gold plumage. The most popular of the stories about the bird is one to the effect that the phoenix lives 500 years, then, building a funeral pile of twigs and leaves, lights it by fanning its golden wings, and dies upon it. From its ashes a young phoenix rises. According to Pliny, the Roman historian, there was a popular belief that only one phoenix existed at a time.

PHOENIX, ARIZ., the capital and largest city in the state in 1917, and the county seat of Maricopa County, is in the south-central part of the state, about 100 miles northwest of Tucson, on the Santa Fe and the Southern Pacific railroads. The city is in a great irrigated valley, the center of interest of which is the Roosevelt Dam. There are copper mines in the nearby mountains. The city contains machine shops and stockyards and has a large trade in fruits (some of them semi-tropical), olives, honey, grain, hay and dairy products. The principal buildings are the capitol, an asylum for the insane, a courthouse, a city hall, a Carnegie Library, a Y. M. C. A., several fine hotels, an agricultural experiment station and a school of music. Nearby are Indian relics of national interest. There are eight private hospitals for patients who come here for a cure for lung trouble. The place was settled in 1870 and was incorporated in 1881. The commission form of government was adopted in 1912. Popula-

tion, 1910, 11,134; in 1917, 19,445 (Federal estimate).

PHONETICS, *fo net'iks,* the science of elementary sounds of the human voice; also the art of representing these sounds by written or printed characters. In its broadest sense the term applies to all sounds of the voice, but in its restricted sense, and the one in which it is generally used, phonetics applies to articulate speech. The sounds combined to form articulate speech are of two general classes, those consisting of tones produced simply by the vibrations of the vocal cords, and those in which these tones are broken up and given distinct articulation by the use of the tongue, palate, teeth and lips. The first class of sounds is represented in the English alphabet by the vowels *a, e, i, o, u, y;* the second by consonants.

Since the English language has forty elementary sounds and there are but twenty-six letters in the English alphabet, some of these letters have to represent more than one sound. This peculiarity makes English somewhat difficult for foreigners to learn to speak and for children to learn to read.

Phonics. In its original meaning phonics is the art of combining musical sounds, but the term is now very generally applied to the art of teaching children the sounds represented by the letters of the alphabet when they first learn to read. Various methods of teaching phonics are in use, but they cannot be described in an article of this length. For a full description of these methods the reader is referred to the primers and first readers of the various series of school readers.

For the different sounds represented by the letters of the alphabet and the methods of mastering the phonetic difficulties of the language, see ORTHOGRAPHY.

PHONOGRAPH. See TALKING MACHINE.

PHONOGRAPHY. See SHORTHAND.

PHOSPHATES, *fahs'fayts,* compounds of phosphoric acid with such substances as lime and magnesia. Phosphates are abundant in the crust of the earth, where they occur as phosphate rock. They also occur in the remains of animals, as bone ash, and in the remains of plants, as vegetable mold. Phosphate of lime forms about 57 per cent of the bones and from 80 to 90 per cent of the teeth of animals, and it appears in the other tissues and fluids. In agriculture the adequate supply of phosphates to plants is a necessity in all deplenished soils. These phosphatic fertilizers consist for the most part of bones, ground bones, mineral phosphates, bone-ash and guano.

PHOSPHORESCENCE, *fos fohr es' ens.* There are several substances, which, if placed in the dark after exposure to light, emit a pale luminosity. The property of thus emitting light is called phosphorescence. Barium sulphide and calcium are highly phosphorescent, and diamonds, after exposure to sunlight, glow for a time. The kind of light to which the phosphorescent body is subjected affects the quality of the light it afterward emits. For example, calcite after having been in sunlight gives an orange phosphorescence; argonite and uranium glass, green; sapphires and rubies, red. Certain minerals are phosphorescent for only a fraction of a second, and the property of phosphorescence is discovered in them only with the aid of delicate apparatus.

There are several animal organisms which exhibit phosphorescence of a quite different sort from that of minerals. Fireflies and glowworms emit a light which is not derived, but is self-generated. Certain fishes living in darkness in the profound depths of the ocean are brightly phosphorescent, and there are microscopic marine infusoria which float in millions on the surface of the water and at night, in the wake of a ship, seem to set the foam afire. Among plants some liverworts, algae and fungi are self-luminous, as well as some of the vegetable decaying matter seen in the woods. Phosphorus, a nonmetallic chemical element, phosphoresces, but its light is due to slow combustion and is altogether different from the other kinds.

PHOSPHORIC, ACID, *fos fohr'ik,* an acid containing phosphorus, hydrogen and oxygen, usually obtained by burning phosphoretted hydrogen in atmospheric air or oxygen. It is also produced by the oxidation of phosphorus acid, by oxidizing phosphorus with nitric acid, by the decomposition of apatite and other native phosphates and in various other ways. It is used in medicine in the form of a solution, or diluted acid, to relieve disordered conditions of the mucous membrane and to strengthen the system when disease has caused softening of the bones.

PHOSPHORUS, *fahs'fohr us,* a yellowish, waxlike substance that ignites at a very low temperature, and burns with a brilliant white flame, giving off a dense white vapor. When exposed to the air phosphorus is luminous in

the dark, and it is from this peculiarity that it receives its name, which comes from two Greek words meaning *light bearer*. Common phosphorus, when pure, is almost transparent and colorless. At common temperature it is a soft solid, easily cut with a knife, and the cut surface has a waxy luster. It melts at about 108° and is exceedingly inflammable. Exposed to the air at common temperatures, it undergoes slow combustion, emits a white vapor of a peculiar odor, appears luminous in the dark and is gradually consumed. On this account phosphorus should always be kept under water when it is desirable to preserve it. A very slight degree of heat is sufficient to inflame phosphorus in the open air. Gentle pressure between the fingers, friction, or a temperature not much above its point of fusion, kindles it readily. Phosphorus is very poisonous. Burns from it are difficult to heal, and a small quantity taken into the system causes death. It should not be handled except under water.

Phosphorus was formerly extensively used in the manufacture of matches, but its use is now forbidden by law in most countries because of the disease known as *phossy jaw*, caused by it. Its compounds known as *phosphates* are used in medicine, and phosphate rock is extensively used as a fertilizer, since phosphorus is an important plant food. It is also an important animal food, and is found in bones and in the brain and nerves in larger proportions than in other tissues.

PHOTO-ENGRA'VING, a process of engraving, by which the picture is first transferred to the block or plate by means of photography. The result is a printed surface, corresponding to the original from which the photographic image was taken. For a description of the different phases of the process, see ELECTROTYPING; HALFTONE; LITHOGRAPHY, subhead *Photo-Lithography;* PHOTOGRAVURE; ZINC ETCHING.

PHOTOGRAPHIC SURVEYING, a form of surveying which originated with the French and adopted to a limited extent in America, particularly in the prairie provinces of Canada. The camera is provided with cross wires and a leveling apparatus. In surveying, two stations (or more) on the area are selected, and the base line between them is measured. At each station a series of exposures is taken, to cover the whole area which is being surveyed. The imperfection of lenses lessens the use of the method.

PHOTOGRAPHY, *fo tog'ra-fi*, literally the art of writing or drawing by light. Photography has become so common that we seldom pause to consider it as one of the most practical and most widely used of the fine arts throughout the world. There is scarcely a field of endeavor in which it is not found. While it is most extensively employed in making portraits and reproducing natural scenery, photography is of great value in the realm of science. The camera, combined with the telescope, enables the astronomer to photograph the heavenly bodies, and to make complete charts of the heavens. By attaching a microscope to the camera, the structure and movements of insects can be pictured and the minute structure of many vegetable and animal organisms revealed.

Processes. Photography consists of three processes—the exposure of a sensitized plate, or taking the picture; developing the exposed plate, or making the negative; printing the photograph, or making the positive. These processes are known as *exposure, developing* and *printing*.

Exposure. The plate consists of glass or celluloid film, having one side covered with gelatin, containing a composition of silver bromide, which is very sensitive to the action of light. The preparation of plates is an industry by itself, and the photographer obtains them already prepared. Most plates are so sensitive that perfect pictures can be obtained by instantaneous exposure. These sensitive films make moving pictures possible.

To obtain a good negative, the photographer must use care in making his exposure. The focus of the camera should be carefully adjusted; the instrument should be so placed that the light will fall upon the object, rather than upon the camera. The light upon the object should be such as to avoid sharp contrasts of light and shade, and the exposure should be timed according to the intensity of the light. The determination of the time is learned only by experience, and amateurs usually over-expose their plates. Views obtained by *snapshots* and *flash light* are results

of instantaneous exposures. While very good negatives may be obtained in this way, they usually lack the detail of time exposures. The exposed plate does not show any trace of the picture.

Developing. The second step consists in developing the negative. This is done in the *dark room,* which is lighted by a small window containing a pane of red glass or by a lamp shielded by a red- or orange-colored globe, because these rays will not produce any effect upon the negative.

The plate is laid in a shallow tray, face-side up, and the prepared liquid, called the *developer,* is poured upon it, after which the tray should be gently rocked to secure an even action of the developer upon all parts of the plate. In developing, the strongest lights and shades appear first, being followed by the more minute details. When these are all visible, the process should be stopped. This is done by removing the plate, washing in cold water and then placing in a bath of hyposulphite of soda, which dissolves the sensitive portion of the film not acted upon by the light. If the exposure and developing have been properly done, this last process should leave a clear, sharp negative. When taken from the hyposulphite bath, the negative should be thoroughly washed and then dried before being used for printing. Tanks containing the prepared fluid are now in use by many amateurs. They take the film direct from the camera and turn out the negative without the necessity of the dark room.

Printing. The picture developed on the plate is called the *negative,* because its lights and shadows are reversed, and in order to obtain a picture which resembles the object, a *positive* must be obtained. This is printed on prepared paper, the negative being placed face-side up in a frame, and the paper laid upon it and exposed to the light for a short time. After printing, the positive is *fixed,* by being soaked in a solution of hyposulphite of soda. It is then *toned;* that is, it is given its proper color by a solution of gold. After toning, the photograph should be thoroughly washed, to remove all traces of chemicals not solidified in the printing, otherwise the picture will fade and discolor. Many preparations for amateur work contain both the fixing and toning chemicals in the same solution, and devices for developing are in use which produce the finished negative by running the film through a specially prepared tank, containing the developer and so constructed that a dark room is not required. The great variety of effects seen is caused by the different methods of preparing the printing paper and the different ingredients used in toning solutions.

Color Photography. Photographing objects in their natural colors has been brought to a high degree of perfection. The process is more complex than that in ordinary photography. The sensitized plate is prepared by covering one surface of the glass with starch granules, alternately red, green and blue. A preparation sensitized to all the colors of the rainbow is then poured over these granules. The plate is placed in the camera with the glass surface towards the lens so that the light will pass through the colored starch granules before reaching the sensitized film. The exposed plate is developed into a positive which is a picture of the object in its natural colors. First-class three-color and four-color prints can be made from these positives, but no process of making prints from them has yet been perfected.

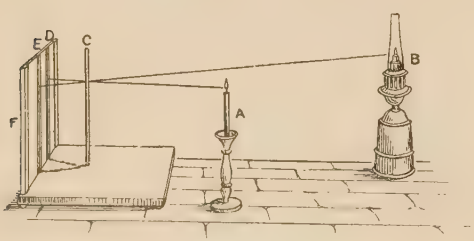
History. The present degree of perfection in photography has been reached after years of study and invention. The first step in this art was the discovery, in 1809, by Thomas Wedgwood, of a way of making crude profiles by the action of light upon paper or cloth that had been soaked in a solution of nitrate of silver. Thirty years later Daguerre laid the foundation of photography by means of the process which bears his name. It consists of printing the picture on sensitized glass. The use of sensitized paper was introduced by a Frenchman named Niepes, and about 1851 the present process of photography was established by an Englishman named Archer, who began the use of the negative as we now know it. From this discovery the various steps in the progress of the art have been in perfecting the sensitized plates and paper and in improving the camera.

Related Articles. Consult the following titles for additional information:
Camera
Daguerreotype
Electrotyping
Halftone
Lithography
Photogravure

PHOTOGRAV'URE, a process of engraving which combines photography and etching. A positive photograph of the picture to be reproduced is made on glass. This is placed in a reverse position on a copper plate covered with a bituminous varnish, and the plate

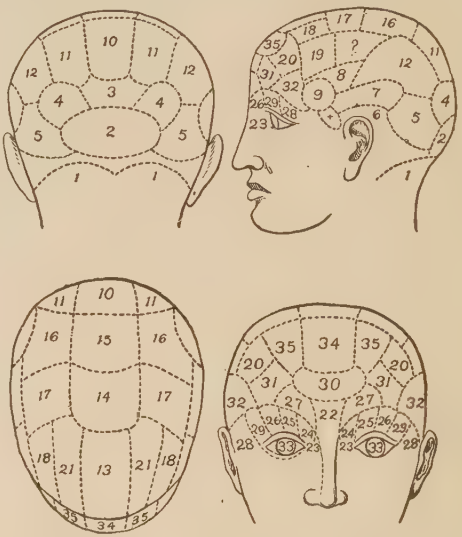
is then exposed to light. The portions of the varnish acted upon by the light are rendered insoluble, while those protected by the shadows remain unchanged. After exposure, the varnish is dissolved from the lines and the plate is etched. After etching it is "retouched" and improved with the graver. By the photogravure process the finest possible results are obtained, and it is extensively used for the production of large pictures, which rival the finest steel engraving in their delicacy and finish. It is also employed in the reproduction of photographs and smaller pictures for books and periodicals. For this class of pictures a less expensive process of preparing the plate is used, and plates of this grade are often prepared for use on rotary presses. See ETCHING; PHOTOGRAPHY.

PHOTOM'ETRY from the Greek *phos,* meaning light, and *metron,* meaning *measure,* is the art of measuring the intensity of a source of light, by comparison with a standard of reference. Instruments called *photometers* have been devised for applying many different methods of measurement to each part of the spectrum of the light from each source. The degree of sensitiveness of the eye of the observer or a difference of sensitiveness between his two eyes affects the result. In other instruments used as photometers, what is measured is not the intensity of light, but the radiation of light. The relative intensity of light from stars is usually determined by a polarizing apparatus, which



brings the brightness of the star above that of the standard of comparison. One method of measurement is shown in the figure. The rod *C* is so placed that the shadows *E* and *D,* which fall upon the screen *F,* are of the same degree of intensity. The relative intensity of the lights is determined by their respective distances from the screen.

PHRENOLOGY, *fre nol'o ji,* a psychological theory based upon the belief that the brain is the organ of the mind and that it is a complex structure, composed of a number of different organs, at first estimated to be thirty-four and later forty-two in number. It was supposed that each of these organs was the seat of a mental power or a sentiment; that the prominences in the skull indicated the location and size of the different organs and that any organ would increase in size and efficiency by the use of the power



PHRENOLOGY'S CHART OF THE HEAD

AFFECTIVE

I.—PROPENSITIES	II.—SENTIMENTS
1. Amativeness.	10. Self-esteem.
2. Philoprogenitiveness.	11. Love of Approbation.
3. Inhabitiveness or Concentrativeness.	12. Cautiousness.
	13. Benevolence.
	14. Veneration.
4. Adhesiveness.	15. Firmness.
5. Combativeness.	16. Conscientiousness.
6. Destructiveness and Alimentiveness.	17. Hope.
	18. Wonder.
7. Secretiveness.	19. Ideality.
8. Acquisitiveness.	20. Wit.
9. Constructiveness.	21. Imitation.

INTELLECTUAL

I.—PERCEPTIVE	
22. Individualty.	29. Order.
23. Form.	30. Eventuality.
24. Size.	31. Time.
25. Weight.	32. Tune.
26. Coloring.	33. Language.
	II.—REFLECTIVE
27. Locality.	34. Comparison.
28. Number.	35. Causality.

of which it was the seat. From this theory was developed a system of determining a person's aptitudes and characteristics by a process of examining the head. Charts showing the location of the different organs of the brain and marked with the mental power which each organ represented were used, and the relative value of these organs was marked upon the chart when the person's head was examined.

Phrenology originated with F. J. Gall, a Viennese physician, early in the nineteenth century, and it was introduced into the United States in 1830, where it soon gained a large number of adherents. Lecturers went about the country giving popular lectures on the subject, examining heads and giving charts for which fees were charged.

With scarcely an exception physicians rejected phrenology, because they considered that the fundamental belief was based upon erroneous ideas concerning the brain, and later investigations have proved that their assumption was correct. While it is now well known that the certain centers in the brain preside over certain functions of the body, it is equally well known that a man's character is not determined by the "bumps" on his head. Phrenology, a so-called science, is merely a theory without any scientific or reasonable foundation.

PHRYGIA, *frij'e a*, in ancient times, a country in Asia Minor which varied in extent and boundary in different periods of its history. Loosely speaking, it may be identified with the central plateau of the peninsula. From Thrace wandering tribes entered the region, made themselves masters of it and settled down into a rustic, peaceable people, engaged in farming and stock raising. After a long period of independence they were overcome, in the seventh century B. C., by the Cimmerians and thenceforth lost their identity as a political unit, falling successively under the rule of Lydia, Persia, Macedon, Pergamum and Rome. In legend Gordius and Midas were kings of Phrygia. See GORDIAN KNOT.

PHYLLOXERA, *fil loks'ur a*, a plant louse that does great damage in vineyards. It is a native of North America, having subsisted for ages, perhaps, on wild grape vines before it became known in grape culture. The pest was discovered in England in 1863, and about the same time it appeared in France, having been carried to those countries on exported American vines. It soon spread to nearly all the grape-growing regions of Europe, causing severe losses. The lice attack either the leaves or the roots of the plants. The roots when invaded become enlarged, then rot; the leaves turn yellow and the plant dies. Vine growers have checked the ravages of phylloxera by inundating their vineyards and saturating the soil about the roots of the vines with carbon bisulphide.

PHYSICAL, *fiz'i k'l*, GEOGRAPHY, that division of geography which deals with the natural features of the earth and the changes that are constantly taking place or have taken place on it. It treats of the natural divisions of land and water, such as continents, hills, rivers, seas and oceans. It is concerned with the external form, extent and location of mountains and valleys and of the outline and characteristics of coasts; also, with the relation and peculiarities of different portions of the earth's surface covered by water, including currents, wave action, depth of the sea, salt and fresh water lakes and the drainage of continents and countries. It treats of the atmosphere, especially in its relation to climate, and it discusses winds, storms, rainfall and general meteorology. It also treats of life upon the globe, especially of the distribution of plants and animals and their relation to their environment, tracing the influence of climate, soil, natural barriers or channels of communication upon the growth and spread of plants and animals, and especially upon the location and development of the various races of men. It does not, however, deal with political divisions, or study plant and animal life from the standpoint of botany and zoölogy. At the same time, physiography is very closely associated with all other branches of natural science.

The agencies which are still producing changes upon the earth's surface are the atmosphere, water and heat. The atmosphere causes changes through winds and rainfall. By these, hard portions of rock are disintegrated and loose portions are carried from higher to lower levels. Water is by far the most powerful agent in producing changes upon the earth's surface. It causes these changes through erosion, freezing and thawing, all of which disintegrate the rocks and aid chemical action, and by the operation of waves and tides. Heat, which is the great internal force of the earth, causes changes by producing changes of temperature and by volcanic action. In volcanic regions the surface is frequently changed by eruptions.

Related Articles. The articles listed below suggest the wide scope of the subject. Attention is also directed to the topics listed at the close of the article Geology.

Aclinic Line	Calms, Region of	Coastal Plain
Arid Region	Canyon	Cold Wave
Atmosphere	Cataract	Coral
Atoll	Cave	Cyclone
Avalanche	Climate	Delta
Basin	Cloud	Desert
Blizzard	Cloud-burst	Dew
Butte		Divide

Doldrums
Earth Currents
Earthquake
Erosion
Fiord
Flood
Flood Plain
Fog
Fountain
Freezing
Frost
Geography
Geyser
Glaciers
Gulf Stream
Hail
Haze
Hemisphere
Hill
Horse Latitudes
Humidity
Hurricane
Icebergs
Island
Isobars
Isothermals
Kuro Siwo
Lake
Lava
Lightning
Llanos
Maelstrom
Marsh
Mesa
Mirage
Mountain
Muir Glacier
Oasis
Ocean
Ocean Currents
Pampas
Piedmont Region
Plain
Plateau
Pole
Prairie
Quicksand
Rain
Rainbow
River
Snow
Snow Line
Spring
Steppes
Storms
Temperature
Thermal Springs
Tides
Tornado
Tundra
Valley
Volcano
Waves
Wind
Waterspout
Whirlpool
Zone

PHYSICAL CULTURE, a term applied to the upbuilding of the human body by means of proper exercise and careful attention to the laws of hygiene.

Health Not a Matter of Luck. Many people still hold to the belief that health is a matter of good or ill luck; that illness comes to us as the result of divine displeasure or indifference. Probably they do not know that there are definite laws of health, just as there are laws of business or government. Perhaps they think there are too many complicated influences such as heredity, environment, accident, temperament, germs and other intangible forces for good or ill for them to reckon with. Others say, "Oh, I'll leave those matters to the family physician. If the children get ill it is time to send for the physician." We quite agree that a skilful physician is one's best friend in time of sickness. The physician and surgeon have a very important mission in the world, and it is one of the noblest attributes of a noble profession that it is concerning itself as much with the prevention as with the cure of disease. This is the accepted modern theory of medical practice.

Action Necessary. But why wait till illness actually comes before concerning yourself with the question of health? Why not build up and fortify your system and the systems of your children against the attack of germs? Why not attain such degree of vitality and power of resistance to disease that you no longer live in terror of drafts, wet feet and contagion? Why not give the children of the land such a degree of vigor that they will go through life enjoying every minute of existence and be able to overcome cheerfully obstacles and discouragements which crush others not so well prepared?

A Lesson from the Greeks. The ancient Greeks, in this respect, were far ahead of us to-day with all our boasted civilization. The care of the body was then of equal importance with the cultivation of the mind, and through systematic habits of exercise and diet, the Greeks attained a perfection of mind and body, a harmonious adjustment of the mental and physical that made them the wonder and admiration of the pagan world. The Greek tutors and parents understood better than we of this enlightened age the necessity of giving the mind a healthy, vigorous body from which to derive its power, and the almost universal success they achieved in bodily training shows how well they understood the principles on which such training should be based.

Weakness and Disease Result from Cause. It is to be regretted that a large proportion of the ills of humanity are due to ignorance of the laws of health. Thousands of school children struggle for an education under serious disadvantages of physical weakness, if not of actual disease, when the trouble lies wholly in the mode of living adopted or permitted by the parents. This condition is simply the result of the law of cause and effect, a law which is never suppressed in nature. If children are weak, nervous, anemic, irritable, stupid or inattentive, there is a reason for it, and the parent should trace back this reason from effect to cause. The suggestions on the following pages are designed to assist not only parents but all others to apply the health principles in a practical way.

Many parents say that their children are not ill; that they are well and strong. Then it is the duty of such parents to keep their children in this condition. However, we should bear in mind that their vigor may be more apparent than real. Big biceps and a bigger appetite do not always indicate vital power. Muscular development secured at the expense of the nervous system is a menace rather than a safeguard. *Keep ever in mind that endurance and resistance to disease are things to be desired.*

What Power of Endurance Indicates. A boy or man may have a fine physique; he may be able to lift great weights, and yet be vulnerable to disease germs. The test lies in endurance. Endurance means the power to sustain work for a great length of time without undue fatigue or exhaustion. *Fatigue comes*

from the accumulation of body wastes. High power of endurance indicates that the body is comparatively free from these wastes or poisons.

Endurance has been one of the secrets of success of the world's great men, such as Washington, Napoleon, Gladstone and Theodore Roosevelt. The latter's achievements are so recent as to be easily recalled. Yet this man of iron will and almost unlimited endurance was at one time in poor health and obliged to remove to the plains and live for a while in the open air. However, while in certain cases a change of climate or scene is beneficial, you can begin, right in your own home, the work of health-building, and in nearly all cases carry it to a successful issue.

Exercise. The value of exercise as a health-building agent is coming to be generally recognized. That pronounced physiological effects may be produced and morbid conditions relieved by exercise is universally admitted. However, we must remember that exercise may be made harmful as well as beneficial. Sometimes the prescribing of exercise in proper kinds and amounts calls for the most exacting and mature judgment. It is not uncommon to hear people say that exercise does not agree with them. Doubtless the fault is not in the exercise itself, but in the way in which it is applied.

Authorities agree that an imposing muscular system is not a sure indication of health. Health depends on perfect functional activity, that is, harmonious action of the vital organs, such as the stomach, the heart, the kidneys, the liver and the lungs. These organs are all encased in the trunk of the body. It may be said that it is in the trunk that the individual lives. This is the human power house. The limbs may be amputated and yet the vital organs will go on doing their work as before, and the individual may enjoy good health. But once impair the efficiency of any of these vital organs, and you have a condition of ill health to a greater or a lesser degree.

The Aim of Modern Physical Culture. It is therefore to the trunk of the body with its vital contents that modern physical culture experts direct their attention. The more perfectly the vital organs coördinate, the higher the individual's vitality. It has been found that there is a close sympathy between the exterior muscles of the trunk and the internal organs, and that by strengthening these muscles it is possible to invigorate the underlying organs. It is therefore of the greatest importance that the abdominal muscles be developed and that the exterior muscles over the heart and lungs be strengthened through suitable exercise. This, in brief, is the aim of physical culture to-day, and the exercises shown on the following pages are planned systematically to build up and strengthen the muscles of the trunk.

The exercises prescribed can be taken in your own home, without any expenditure for special clothing or apparatus. It is important that the exercises be taken in a well-ventilated room, and that sufficient loose clothing be worn to protect the system from cold. To the beginner a caution is necessary: One unaccustomed to these exercises is very liable to indulge too freely at the start. When this happens, muscular soreness and lameness follow. It is far better to do too little than too much, and the exercise should be continued only long enough to produce mild fatigue, *never to the point of exhaustion.* The amount of exercise should be increased gradually as the strength improves. While the most desirable hours for these exercises are just before retiring at night, or when one rises in the morning, they may be taken at any time if other hours are more convenient.

It is not supposed that one will attempt all of the following exercises at the beginning. Only one or, at the outside, two should be practiced at first. After this, one exercise after another can be added as the strength increases and the system is invigorated. Doubtless but few will care to practice all of the exercises given. Neither is it necessary that they be taken in the order in which they are named; some may prefer to select certain numbers, others another series of numbers. The chief point is that a certain amount of exercise be taken with regularity and that the exercises adopted be such as to bring all the muscles of the trunk into activity.

Exercises for Practise. The positions of the body in the following exercises are explained below:

Exercise 1. Lie flat on the back. Raise first one leg and then the other to a perpendicular position. (See next page, Figs. 1 and 2.)

Exercise 2. Raise and lower both legs. Continue until mildly tired. This is an excellent exercise for the abdominal muscles.

Exercise 3. Same position as in Exercise 1, Hands clasped behind the head. Pull up to sitting position. (See Fig. 3.)

Exercise 4. Stand erect, arms outstretched to the side horizontally. Twist to left as far

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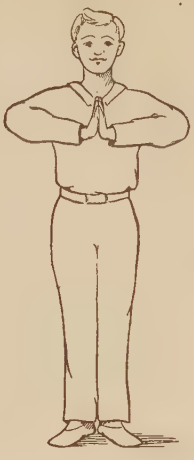

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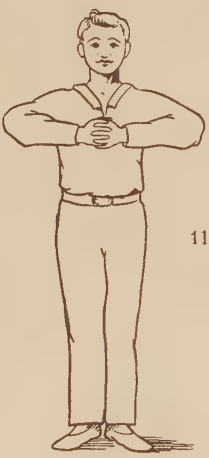

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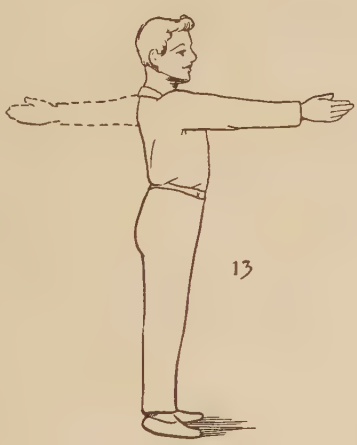

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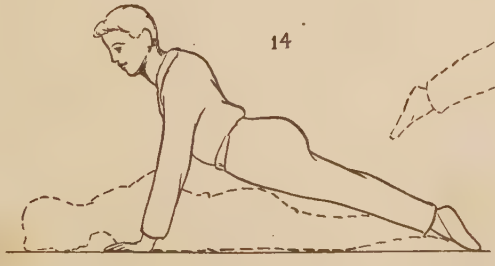

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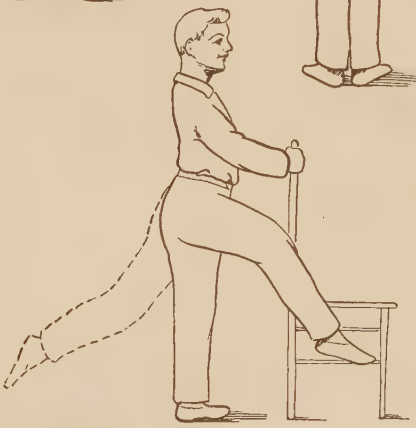

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as possible, then twist to the right. (See Fig. 4.)

Exercise 5. Hands on hips. Bend first to right as far as possible. Then repeat to the left. (See Fig. 5.)

Exercise 6. Stretch hands overhead. Bend back as far as possible, repeating until tired. Alternate by bending forward and trying to touch toes. (See Fig. 6.)

Exercise 7. Hands on hips. Twist the trunk around in a circle, first one way, then the other. (See Fig. 7.)

Exercise 8. Hands on hips. Lower the trunk to a squatting position and raise to standing. (See Fig. 8.)

Exercise 9. Tense the muscles of the neck and turn head from side to side, making one set of muscles resist the other in the movement. In the same manner turn the head forward and back and around in a circle, first to the left, then to the right. This is to develop and strengthen the neck. A large neck indicates power. It insures a good blood supply to the brain. (See Fig. 9.)

Exercise 10. Place the palms of the hands together in front of the breast and press hard. (See Fig. 10.)

Exercise 11. Lock the fingers to gether in front of the chest and pull one hand against the other. (See Fig. 11.)

Exercise 12. Lock the hands behind the back and alternately pull one against the other and push them together. (See Fig. 12.)

Exercise 13. Arms outstretched horizontally. Make the hands describe a full circle forward and back. (See Fig. 13.)

Exercise 14. Place the hands on the floor, the body outstretched, face downward. Raise and lower the body from the floor, dipping the body until the nose touches the floor. (See Fig. 14.)

Exercise 15. Hands on back of a chair or table. Raise and lower the knees rapidly, as in running. (See Fig. 15.)

Caution. It is not intended that all these exercises be taken at any one time. Selections may be made from them according to taste. If the doing of these exercises becomes drudgery to the child, stop a while, but resume them again as soon as possible. Let there be one day in the week of absolute rest.

Wise Selection of Food. Food is closely related to health. The quantity and quality of food should be suited to the needs of the individual. This means that it depends very largely upon age, climatic conditions and occupation. In general, one engaged in an occupation which calls for vigorous and prolonged muscular exercise in the open air requires a larger quantity of food and more stimulating food than one engaged in sedentary occupations. There are, however, exceptions to this general rule. These exceptions are very apparent among certain classes of people who take directly opposite views in regard to the value of meat as an article of food. Those known as vegetarians exclude meat from their diet entirely, while we find others who subsist almost wholly upon meats. However, the great majority make use of a mixed diet, in which vegetable foods and meats are mingled in varying proportions.

In the last analysis, the quantity and nature of food depend upon the individual. Neither medical science nor the systematic study of disease have yet been able to disprove the truth of the old adage, "What is one man's meat is another man's poison." In other words, those articles of food which seem to be perfectly adapted to one individual, and by that person easily digested, are to another almost entirely indigestible and cannot be eaten without injury.

Food should be nutritious, readily digestible and free from an excess of condiments or other substances which highly seasoned food contains. For all such substances as need cooking, thorough cooking should be done. In winter one needs more food than in summer, and usually one eats more meat and more fats in winter than in summer because of the heat-producing quality of these substances.

Few Know How to Eat Properly. More attention should be given to the manner of eating than is bestowed upon it by a large number of people. All vegetable substances contain more or less starch, and unless starch is digested, it furnishes no nutriment. One should remember that the digestive process of starches begins in the mouth by the mingling of saliva with the food. Therefore, food should be thoroughly masticated. One should eat slowly and chew the food until the saliva is thoroughly mingled with it. By doing this the food becomes more thoroughly digestible, furnishes a larger proportion of nutriment, and consequently a less quantity supplies the needs of the system. Those who eat rapidly invariably eat too much and overwork the digestive organs. This practice in the course of time cannot fail to lead to the weakening of these organs and consequent ill health.

Food should be taken at regular intervals. The digestive organs are rhythmic in their action, and when they become accustomed to act at certain intervals, they perform their duties more satisfactorily if this custom is followed. The average adult eats three meals in twenty-four hours; some believe in eating but two. However, if other conditions are equal, the person eating two meals a day

will take and assimilate as much food as the one eating three; the first simply eats more at a time. Young children need to eat more frequently than adults, and this need should always be met. However, it should not degenerate into a habit of constantly eating between meals, after the children have reached such an age that there is no necessity for their eating more frequntly than adults. Another very injurious habit which children are sometimes allowed to form is that constantly munching. This always keeps undigested food in the stomach, and tends to overwork that organ and consequently to irritate it.

Pure Air a Necessity. Pure air is as essential as pure food. One can live for hours and even days without food and drink, but one cannot live five minutes without breathing.

We pay too little attention to proper ventilation. Defective ventilation is one of the most prolific sources of tuberculosis and other lung troubles. The home, and especially the sleeping rooms in the home, should be thoroughly ventilated. People are recognizing the importance of pure air, and in most modern dwellings good systems of ventilation are provided. However, in many of the older houses these are either defective or wholly wanting. In such cases, care should be taken to let in air from the outside at frequent intervals. One should remember that cold air is not necessarily pure air, and a room whose temperature is below freezing may, from this point of view, need ventilation as much as one which has a temperature of 70°, or even more. Schoolrooms and all other public buildings should be thoroughly ventilated every time they are vacated. At each recess the doors and windows of the schoolroom should be thrown open, even in cold weather, for a few minutes, to let the foul air escape and pure air enter. This should be done when the building is provided with a good system of ventilation, for no system provides a sufficient circulation to remove all the foul air and provide each occupant with all the fresh air necessary.

Breathing Exercises. Breathing exercises in the open air, except in cold weather, are very beneficial and strengthening. In taking these exercises one should stand erect with hands on hips and head thrown back a little. Air should be inhaled slowly until the lungs are filled to the utmost capacity, then the air should be expelled from the lungs as completely as possible. Exhalation may be slow or rapid, or the slow and rapid movements may alternate. The same effect is secured by practicing these exercises in a room with windows open so as to give as full a circulation of air as is obtained out of doors. In all cases the air should be inhaled through the nostrils.

Breathing exercises are beneficial to everyone, but they are necessary to the maintenance of health for those who are engaged in sedentary occupations. In such cases breathing exercises should be taken at least twice a day—morning and evening. These more formal exercises may be supplemented by an occasional full breath taken while at work. Let the worker pause for a moment, throw the head and shoulders back and inflate the lungs to their full capacity. This secures relaxation of nerves and muscles, and helps invigorate the blood.

In the beginning breathing exercises, like muscular exercises, should be taken lightly, for they can cause more or less of a strain upon the system. As one becomes accustomed to them, they can be increased in length and vigor. But if indulged in too freely at first, and not begun gradually, they are liable to result in injury.

Related Articles. Consult the following titles for additional information:

Athletics	Food	Gymnastics
Breathing	Games and Plays	Hygiene

PHYSICAL GEOGRAPHY. See page 2829.

PHYSICS, *fiz'iks*, from a Greek word meaning *nature*, is that study which deals with natural phenomena. It was once called *natural philosophy*, but the shorter term *physics* is now very generally employed; it more clearly defines the subject, for it teaches of physical properties of matter. If changes occur in a substance which alter its very nature, that change is in the realm of chemistry, for it is a chemical change; if a change does not alter the character of a substance it is a physical change. For example, if water is boiled and changed to steam and vapor, each part is yet water, and upon cooling and condensing it again becomes water, for no alteration of its elements has occurred; such phenomena are studied in physics. However, if a particle of water is separated into its elements, neither of the two elements into which it can thus be separated is water. This is a chemical change, and belongs to chemistry.

Wonder Questions in Physics

If you throw a ball into the air how do you know that it will come down again?

Any object thrown into the air falls back again because it is pulled to earth by the force of gravity. Since the direction in which this force acts at any point is nearly toward the earth's center, any falling body will drop vertically. If it were not for the force of gravity a ball thrown into the air would go flying off into space and never come back again.

Do all falling bodies fall with the same rate of speed?

Heavy bodies seem to fall faster than light ones, but that is because in their descent they are less impeded by the air than light ones. If we should exhaust the air from a closed tube, place a coin and a feather in one end and then invert the tube, we would see the coin and the feather fall side by side until they reached the bottom. All freely-falling bodies have the same rate of motion in a vacuum. But when a feather and a coin are dropped in air the coin reaches the ground first because it can push against the air more effectively than can the feather.

Why is a person standing in a street car apparently thrown forward when the car stops suddenly?

This familiar action is the result of the law of inertia. Inertia is the property which causes any body to resist any attempt to start it when it is at rest, or to change the direction or amount of motion when it is moving. A person standing in a moving street car continues to move forward even though the car stops, because inertia makes him do so. That is why he is liable to lose his balance when there is a sudden stop. Also, if the car is at rest and starts forward suddenly, the standing passenger seems to be thrown backward. The reason for this is that inertia makes him tend to stay where he is, while the car moves forward under him. To keep his balance he must push backward with his feet. Again, when the car goes around a curve it changes its direction, of motion, while the standing passenger tends to keep the original direction. Therefore he seems to he thrown sidewise against the car.

Why does rubbing the hands together make them warmer?

Rubbing any two substances together results in friction, and friction produces heat. Drivers who rub their hands briskly against their clothing in cold weather are applying the principle of friction, though they may not recognize it as a law of physics. Examples of the production of heat through friction are numerous. Before matches were invented people started fires by rubbing hard pieces of wood together, or flint and steel. Car-wheel axles sometimes get so heated through friction that the cars are set on fire. Friction is defined as the resistance that must be overcome in moving one surface over another.

Is a perpetual motion machine a possibility?

No one will ever be able to make such a machine until he disproves the law of conservation of energy. By this law we mean that when energy is converted from one form into another there is neither gain nor loss of energy; energy cannot be created or destroyed. So long as this law holds good no machine will ever be invented that will run continuously without the help of some external force. While a machine is in motion there is friction to overcome, and energy must be used to overcome this fricton. Unless some outside force is applied there will be a gradual decrease of energy in the machine, and it will finally cease to operate.

Of what is steam made?

Steam is the gaseous form of water. It is colorless and invisible, though we often speak of seeing steam coming out of the spout of a tea kettle. What we actually see is the steam changed back into small particles of liquid by the cooler temperature of the air. The visible cloud really begins an inch or so from the spout. Everyone has noticed that when water is boiling there are small bubbles on the surface. These are bubbles of steam, which have formed at the bottom of the heated water and floated up to the top.

Why can you not see around a corner?

Objects become visible to us when they send back to the eye light received from some luminous body. Light waves travel in straight lines when passing through a medium of uniform density, and because the waves cannot turn around corners we cannot see the objects around those corners. For the same reason a shadow is formed on a wall by a screen placed between a lamp and the wall. As the light waves from the lamp strike the screen, some are reflected back to the eye

and the rest are absorbed. None of the light, however, can pass around the screen, and thus the space on the wall behind it is in the dark.

Why does the straw in one's lemonade look bent at the surface of the liquid?

Though light travels in a straight line through a medium of uniform density, a ray of light will bend when it passes from one medium to another of different density. This is what happens when a ray passes from air to the denser lemonade. As your eye follows the straw in your glass you see that it seems to be bent where it enters the liquid. The ray which the straw sends back to your eye is actually bent at this point, and so the straw seems to have the same bend. Such bending of a light ray is called refraction. What other examples have you noticed?

If a distant star within our range of vision should suddenly grow dark would it become invisible at once?

No, because the light from the stars does not reach the eye instantaneously, though it seems to. Light travels at the rate of about 186,000 miles a second. Now this rate is practically instantaneous for objects on earth, but it is a different matter in the immeasurable depths of space. It takes eight minutes for the sun's rays to strike the earth, and the rays from the nearest star travel for four years and five months before they reach us. The rays which show us the north star started on their journey about forty-four years ago, and we are seeing rays now from stars which ceased to exist thousands of years ago.

Why cannot eggs be boiled on top of a mountain?

Increasing the pressure on the surface of water raises the boiling point, and diminishing the pressure lowers the boiling point. That is, the temperature of water which boils at sea level is much higher than that which boils on a mountain because the air at sea level is much denser than that higher up. On top of a mountain the pressure of the air is so low that though the water may boil it does not become hot enough to cook the eggs.

Why do the contents of a thermos bottle remain hot or cold?

The thermos bottle is constructed on the principle that heat may be conducted from one place to another. Such a bottle consists of a double glass container enclosed in a metal case. The inner glass vessel is fused to the outer one after the air between them has been exhausted. The space between the two vessels is practically a vacuum, and a vacuum will not conduct heat. Therefore a hot liquid poured into the inner vessel remains hot because its heat cannot escape across the vacuum, and a cold liquid remains cold because outside heat cannot reach it. The principle of conduction is also applied in the construction of a fireless cooker; the space between two boxes is packed with excelsior or other substance through which heat cannot flow, and the hot food in the inner box retains its heat indefinitely.

Why does not the car on a loop-the-loop railway fall off the track when it is inverted at the top of the loop?

Such a car clings to the rails because of centrifugal force. Centrifugal force is a pull from the center of rotation, and it is the result of the tendency of every object to move in a straight line. A body rapidly rotated resists the force that makes it move in a curved path, and seems to be pulling away from the center about which it is turning. This pulling from the center is what keeps the water in a pail from falling out, even when the pail is whirled around upside down. We see an example of centrifugal force in the mud that flies off the wheels of a swiftly-moving vehicle running on a muddy street.

Why do glass or earthen pitchers containing water sometimes burst when the water freezes?

Though water contracts when cooled, this contraction ceases just before the freezing point is reached, or at about 39 degrees Fahr. When cooled further the water expands to the freezing point, and when it freezes it expands still further. Therefore breakable pitchers sometimes crack and fall apart because of the expansive force of the freezing water. This power of expansion is also shown in the breaking up of rocks when water contained in their crevices freezes. The bursting of water pipes in cold weather is likewise a familiar illustration of the expansive force of freezing water.

Why does one's hand feel cold when it is dried in the air after being wet with gasoline?

This is due to the fact that gasoline evaporates very rapidly. Evaporation is the process by which moisture is taken into the air in the form of vapor. Heat is always absorbed during evaporation, but when the hand is wet with water the process is much slower than in the case of gasoline. Accordingly, one does not get so great a sensation of coolness when the drying hand has been dipped in water as when it has been placed in gasoline.

Outline on Physics

I. Introduction
II. Properties of Matter
  (1) Occupies space
  (2) Special properties
III. Mechanics of Solids
  (1) Energy
  (2) Motion and velocity
  (3) Gravity and laws of falling bodies
  (4) Curvilinear motion
  (5) Work
  (6) Machines
IV. Mechanics of Fluids
  (1) Characteristic phenomena
  (2) Laws of pressure in fluids
  (3) Density and specific gravity
  (4) Pressure of the atmosphere
  (5) Machines depending on air pressure
V. Sound
  (1) Wave motion
  (2) Transmission and velocity
  (3) Intensity and loudness
  (4) Beats
  (5) Pitch
    (a) Of strings
    (b) Of pipes
  (6) Quality
  (7) Harmony and discord
VI. Light
  (1) Nature
  (2) Reflection and refraction
  (3) Lenses
  (4) Color
  (5) Optical instruments
VII. Heat
  (1) Temperature
  (2) A cause of expansion
    (a) Solids
    (b) Fluids
  (3) Measurement of
  (4) Change of state
  (5) Transmission
  (6) Heat and work
VIII. Magnetism and Electricity
  (1) Magnetic action
    (a) Nature
    (b) Effect
  (2) Electricity
    (a) Electrification
      (1) By induction
      (2) By conductors
    (b) Current electricity
      (1) Nature
      (2) Effect
    (c) Electrical qualities
    (d) Machines

Questions on Physics

What do you understand by physics?

What is meant by properties of matter?

Explain transparent, opaque, elastic.

What is meant by inertia?

Define the two kinds of energy.

What are the two obvious effects of energy or force on matter?

What is work?

What is velocity? Acceleration?

What is the simplest example of uniform acceleration?

What is gravity?

What is the law of universal gravitation?

How far will an apple fall the first second? A ten-pound stone?

Will a feather fall the same distance?

Would it fall the same distance in a vacuum?

Define vacuum.

What is center of gravity? Explain equilibrium.

Which learns to walk more easily, the biped or quadruped? Why?

What makes it so difficult to walk on ice?

What is friction? In what cases is it desirable to do away with it altogether? What means are used to accomplish this?

What would happen if friction did not exist?

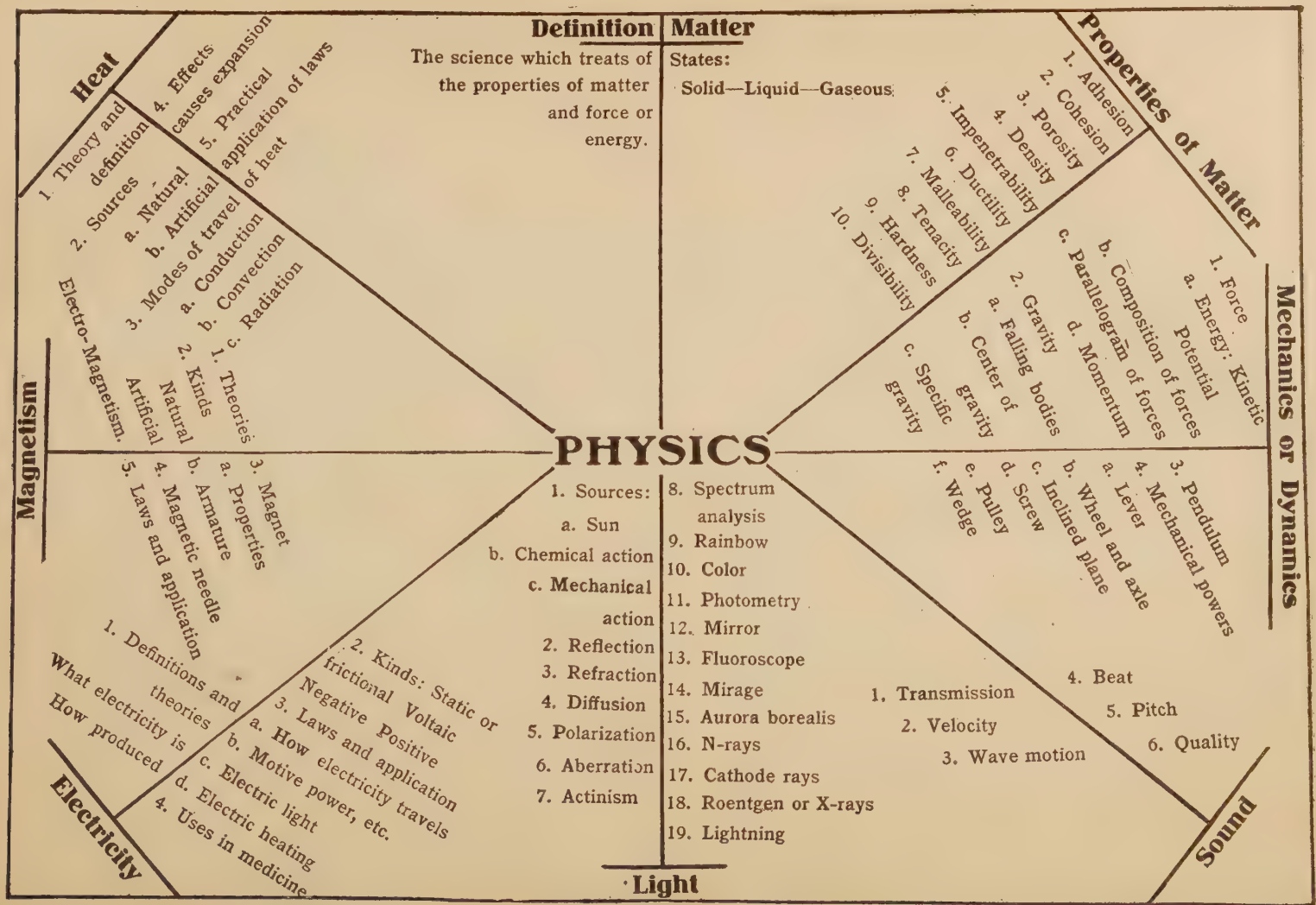
Give practical examples of cohesion and adhesion.

What is the difference between a solid and a fluid?

Name the two divisions of fluids? How are they distinguished?

In what directions do fluids exert pressure?

Is the pressure the same in all directions?


PHYSICS
Definition
The science which treats of the properties of matter and force or energy.
Matter
States:
Solid—Liquid—Gaseous
Properties of Matter
1. Adhesion
2. Cohesion
3. Porosity
4. Density
5. Impenetrability
6. Ductility
7. Malleability
8. Tenacity
9. Hardness
10. Divisibility
Mechanics or Dynamics
1. Force
a. Energy: Kinetic
Potential
b. Composition of forces
c. Parallelogram of forces
d. Momentum
2. Gravity
a. Falling bodies
b. Center of gravity
c. Specific gravity
3. Pendulum
4. Mechanical powers
a. Lever
b. Wheel and axle
c. Inclined plane
d. Screw
e. Pulley
f. Wedge
Sound
1. Transmission
2. Velocity
3. Wave motion
4. Beat
5. Pitch
6. Quality
Light
1. Sources:
a. Sun
b. Chemical action
c. Mechanical action
2. Reflection
3. Refraction
4. Diffusion
5. Polarization
6. Aberration
7. Actinism
8. Spectrum analysis
9. Rainbow
10. Color
11. Photometry
12. Mirror
13. Fluoroscope
14. Mirage
15. Aurora borealis
16. N-rays
17. Cathode rays
18. Roentgen or X-rays
19. Lightning
Electricity
1. Definitions and theories
What electricity is
How produced
2. Kinds: Static or frictional Voltaic
Negative Positive
3. Laws and application
a. How electricity travels
b. Motive power, etc.
c. Electric light
d. Electric heating
4. Uses in medicine
Magnetism
1. Theory and definition
2. Sources
a. Natural
b. Artificial
3. Modes of travel
a. Conduction
b. Convection
c. Radiation
Electro-Magnetism.
1. Theories
2. Kinds
Natural
Artificial
3. Magnet
a. Properties
b. Armature
4. Magnetic needle
5. Laws and application
Heat
1. Theory and definition
2. Sources
a. Natural
b. Artificial
3. Modes of travel
a. Conduction
b. Convection
c. Radiation
4. Effects causes expansion
5. Practical application of laws of heat

Physics touches the experience of every individual in almost numberless ways. Heat, light, sound, electricity, gravitation, mechanics—to mention but a few relations to human life—are within the realm of physics. A more complete list appears below.

Related Articles. Consult the following titles for additional information:

Adhesion
Boiling Point
Boyle's Law
Calorie
Capillarity
Center of Gravity
Centrifugal Force
Centripetal Force
Cohesion
Composition of Forces
Compressed Air
Crookes Tubes
Diffusion
Ductility
Dynamics
Dynamo
Echo
Elasticity
Electricity
Energy
Evaporation
Expansion
Extension
Falling Bodies
Flexibility
Fluorescence
Foot Pound
Force
Freezing
Friction
Geissler's Tubes
Gravitation
Gravity, Specific
Hardness
Heat
Horse Power
Hydraulics
Hydrostatics
Ice
Inclined Plane
Inertia
Lens
Lever
Light
Liquid
Liquid Air
Magnetism
Malleability
Matter
Mechanical Powers
Mechanics
Melting Point
Momentum
N-Rays
Parallelogram of Forces
Pendulum
Penumbra
Perpetual motion
Photometry
Pneumatics
Polarization of Light
Porosity
Pulley
Reflection
Regulation
Roentgen Rays
Siphon
Solid
Sound
Spectrum Analysis
Spring
Steam
Steelyard
Temperature
Tenacity
Thermometer
Vacuum
Vapor
Velocity
Water Power
Weight

PHYSICISTS

Archimedes
Bacon, Roger
Bunsen, R. W. E.
Curie, Pierre and Marie
Edison, Thomas A.
Fahrenheit, Gabriel D.
Faraday, Michael
Foucault, Jean B. L.
Galvani, Luigi
Gay-Lussac, J. L.
Helmholtz, Hermann von
Kelvin, Baron
Michelson, Albert A.
Morse, Samuel F. B.
Newton, Isaac, Sir
Roentgen, Wilhelm K.
Tesla, Nikola
Torricelli, Evangelista
Volta, Alessandro
Watt, James

PHYSIOGNOMY, *fiz i og'no mi,* the so-called science of reading character in the countenance. In a treatise believed to have been written by Aristotle is found the first attempt to systematize character-reading by means of bodily signs. In this essay such qualities as courage, vanity, prudence, are supposed to be invariably associated each with some certain physical characteristic. The writer observed that each animal has a special dominant trait; for instance, the fox has cunning; the wolf, ferocity. By analogy he concluded that a man whose face bore resemblance to a particular animal must have that animal's disposition. All this, of course, is absurd and quite in keeping with the naïve "science" of antiquity. In the latter part of the eighteenth century Lavater, a Frenchman, developed an elaborate system of physiognomy, the scope of which he enlarged so as to include all the supposed relations between the physical and moral nature of man. A scientific exposition of the subject was written in 1806 by Sir Charles Bell, and the scientific view was advanced by the work of Darwin.

Biological science has shown that much of the human play of features is a survival of animal expression of feeling. Thus the polite sneer is but a refinement of the ferocious snarl of our simian ancestors, and indicates a survival also of ferocity, diluted, perhaps, in the one who sneers. Suppression of certain emotions and the cultivation of others is supposed in time to work changes in the face. There is no doubt that certain fixed attitudes of mind become in time reflected in the countenance. The optimist's mouth has a tendency to tilt up at the corners, the pessimist's to droop. The study of human features is intensely interesting, if based on scientific method and not on the pseudo-scientific and "occult" notions of the phrenologist.

PHYSIOGRAPHY. See PHYSICAL GEOGRAPHY.

PHYSIOLOGY, *fiz i ol'o ji,* that branch of science which treats of the structure, functions and processes of the human body. As usually studied it is divided into three branches. These are *anatomy,* which treats of the structure of the human body; *physiology,* which describes how the various parts of the body work together to perform their functions; and *hygiene,* which instructs one in the ways by which the body may be kept in health.

The human body is at once a home and a machine. It is the home of the mind and the soul; we know little about the mind except that we have by observation and study worked out many of the laws by which it operates. The mind and the soul may be one and the same thing, for aught we know. With these physiology is not concerned, except as we view the mind and body as landlord and tenant.

A Machine Which Repairs Itself. Viewed as a machine, the human body is the most wonderful mechanism of which we have knowledge. In a general way, each of us is acquainted with this matter-of-fact statement. So perfect is the healthy body in the per-

Outline for Study of the Human Body

I. Origin of Life
  (1) Cell
    (a) Protoplasm
    (b) Nucleus
II. Tissues
  (1) Osseous tissues or bones
  (2) Muscular tissues or flesh
  (3) Other connective tissues
    (a) Areolar
    (b) Adipose or fat
    (c) Cartilage or gristle
    (d) Marrow
  (4) Nerves
III. Circulation
  (See outline accompanying article on Circulation)
IV. Respiration.
  (1) Organs
  (2) Function
  (3) Movements
  (4) Hygiene
  (5) Diseases
V. Digestion
  (1) Organs
    (a) Stomach
    (b) Intestines
    (c) Liver
    (d) Other organs
  (2) Processes
    (a) Absorption
    (b) Secretion
    (c) Elimination of waste
VI. Nervous System
  (1) Definition
    (a) Nerve centers
    (b) Nerves
      (1) Sensory
      (2) Motor
  (2) Divisions
    (a) Cerebro-spinal
    (b) Sympathetic
  (3) Organs
  (4) Functions
    (a) General
    (b) Special
      (1) Touch
      (2) Taste
      (3) Smell
      (4) Sight (See outline on the eye)
      (5) Hearing (See outline on the ear)

Questions on Physiology

How many bones are there in the human body?

In what way is a combination of strength and elasticity secured for the spinal column?

Explain, in a general way, the functions of the spinal column.

How are the bones of the head united?

Why are the bones more likely to break in old age than in youth?

Are the teeth a part of the skeleton?

How many ribs has man?

What is the collar bone?

What are the two forms of muscular tissue?

Name the three classes of muscles.

What is the chief function of fat?

Explain cartilage.

What is marrow?

What is respiration?

Name the organs of respiration.

Describe the lungs and bronchi.

What is bronchitis? Tuberculosis?

What is the function of the salivary glands?

Explain the work of the stomach.

What part does the liver play in digestion?

What are some of the causes of indigestion?

What do we mean by the nervous system?

What is a nerve?

Explain the difference between sensory and motor nerves.

What are the two divisions of the nervous system?

What organ is the center of the nervous system?

What is the average weight of the brain?

How does the skull protect the brain?

Why is such great protection necessary?

What is meant by reflex action?

What is the first requisite of a healthy nervous system?

Wonder Questions in Physiology

What is the smallest unit in the human body?

The unit of structure, or start in life, as it may be called, is a cell of protoplasm. Every one of us is made up of countless numbers of cells, each of which is perhaps one-thousandth of an inch in diameter. These cells multiply by dividing into two parts, for each part becomes a new cell and continues the process. Different sets of cells are grouped together for special purposes. Some form nervous tissue, others form bone, and so on.

What makes our muscles move?

There are two kinds of muscle, voluntary and involuntary. The first kind move when we consciously will to have them do so, as when we reach out a hand and pick up a book. The second kind move without conscious effort on our part, as the muscles that move the food about in the stomach. Voluntary muscles are composed of numerous tiny fibers, each of which is connected with the brain by a nerve; when the brain wills it, the message to contract is sent along the nerve, and the muscle obeys the signal. Involuntary muscles are also stimulated by nerves which come from nerve centers, but we cannot control their contractions.

What causes the pulse beat which can be felt in the wrist or at the temples?

The pulse is the swelling of an artery. At each beat of the heart a certain amount of blood is forced into the great artery called the aorta. The aorta and all its branches throughout the body are already full of blood, and the extra blood forced into them causes a wave that can be felt at the wrist and temples. This is because the arteries in these places are near the surface of the body. But the same swelling is taking place in arteries all over the body.

Why does blood circulate through the body?

It is by means of the blood that nourishment is carried to the cells of the body, and wornout tissues are repaired and built up. Though the food enters the stomach in a partially solid state, it is reduced to liquid form by the action of the digestive juices. Through the walls of the small intestine the fluid food passes into a network of blood vessels, and is then carried into the blood stream. In circulating through the body the blood also carries waste matter to the lungs, kidneys and skin, which take the waste out of the circulating fluid and cast it out of the body.

What is the difference between the veins and arteries?

Arteries distribute blood poured out from the heart, and veins collect it and return it to the heart. The arterial system begins with a single large tube, the aorta; from this tube branch out many other tubes which grow smaller and smaller until they pass into the capillaries. At the opposite end of each capillary is a minute vein. These tiny veins unite to form larger tubes, and this is repeated until all unite to form two large veins. Both arteries and veins have walls composed of three coats, but those of the veins are not so thick as those of the arteries. Therefore the arteries keep their tubelike shape whether they are filled with blood or not, while the veins collapse when not filled. If a vein is cut blood flows from it in a slow, even stream, but the blood from a cut artery issues in jets.

Why does the mouth become dry when one has "stage fright"?

The mouth is kept moist by the flow of saliva from special glands. When one becomes nervous the salivary glands are affected in such a way that the secretion of saliva is checked. This makes the mouth dry and speaking becomes difficult.

What gives the blood its red color?

Blood is red because it contains millions of tiny red disks called corpuscles. It contains white corpuscles as well, but these are not nearly so numerous as the red ones. About five million of the latter are contained in a drop of blood the size of a pinhead. A single red corpuscle under the microscope looks pale yellow, as also does a drop of blood when spread out on a piece of glass. Crowded densely together in a mass however, millions of these corpuscles look red.

Should one exercise violently after a heavy meal?

The answer to this question is no. The digestion of a hearty meal calls for a goodly supply of blood in the walls of the stomach, and this means that the heart must beat faster and harder to supply the needed blood. If, when the food is digesting, one exercises too actively, the muscles, as well as the stomach, will call for a good deal of blood, and neither will get the proper amount. As a result the heart will work too hard, and the food will not digest properly.

What causes the ridges on the inside of the finger tips?

These ridges indicate where the outer skin, or epidermis, fits onto the inner skin, or dermis. The upper surface of the dermis is covered with minute elevations called papillae, while the inner surface of the epidermis has tiny pits corresponding to the projections of the dermis. These are molded onto each other in such a way that the rows of papillae are seen on the epidermis as fine ridges. Though they occur in other parts of the body, the papillae are especially well developed on the inside of the hand. Those on the thumb and finger tips are used as identification marks in the detection of criminals, for no two persons ever have identical markings. An interesting story by Mark Twain, entitled Pudd'nhead Wilson, is based on this fact.

What is the cause of wrinkles?

Beneath the dermis there is a loose tissue in which fat is deposited. When the tissue is well supplied with fat the skin appears smooth and well filled out, but when the fat is used up the skin becomes too large for the part it covers, and shrivels up. The best way to get rid of wrinkles is to build up the tissue.

What makes hair turn gray?

The color of hair is determined by a pigment in the cells which occupy the inside of the hair. When hair turns gray it is a sign that there is a deficiency of pigment. Since less pigment is secreted in old age, elderly people almost always have gray or white hair. Illness, worry and shock are other causes of graying hair, and there are reliable reports of hair turning gray over night.

Why is the sense of smell deadened when one has a cold?

The cells in which the nerves of smell terminate are distributed in the mucous membrane which lines the upper part of the nose. When one has a cold in the head the membrane is inflamed, and the nerve endings become covered with too much mucus. This greatly impairs the acuteness of the sense of smell.

What makes the mouth water when one smells an appetizing odor?

Such an odor stimulates the salivary glands and causes an additional secretion of saliva. The response of the glands to the odor is an example of reflex action.

Why does one grow faint and find breathing difficult on a high mountain?

At sea level the air is everywhere pressing upon the body in the ratio of about fifteen pounds to the square inch. Since this weight is balanced by an equal pressure of air inside the body, it is not noticed. As one climbs a mountain the air becomes continually lighter, until at a height of three and one-half miles it is only half as dense as at sea level. Because the pressure on the body is correspondingly lessened, the flow of blood is distributed, and the climber becomes dizzy and faint. At this height, too, a lungful of air contains much less oxygen than at sea level, and it is difficult to supply the lungs.

What causes the small crescent-shaped spot at the base of each finger nail?

Our nails grow from cells at their roots. When the cells first form they are soft and tender, and are opaque and whitish, like the other skin. As they grow, however, they become hard and transparent, and we can see the pink true skin through them. Therefore the upper part of the nail has a rosy tint, while the nontransparent spot at the base is white.

Why do we become thirsty easily in warm weather?

Though thirst seems to be merely a dryness of the mouth and throat, it is more than that. The sensation is an indication that there is a lack of water in the tissues of the body. In warm weather the body perspires freely, reducing the water content of the tissues. As a result there is created the desire for water, or thirst.

How can a disordered stomach cause pain in the head?

A disordered stomach means a case of indigestion, and undigested food means the manufacture of poisons in the system. These poisons or toxins, as they are often called, get into the blood and are carried to the nerves of the head. The nerves of the head are easily irritated, and so a headache is frequently a danger signal that the stomach is not working properly.

What is the cause of bodily fatigue?

We know that we become tired when we exercise too vigorously, take too long a walk, work too hard, etc. What is actually taking place is this: the working muscles are continually throwing off poisonous substances, and the accumulation of these toxins causes the state we know as fatigue. Toxins constitute the waste material which is thrown off by the muscles faster than the blood can carry it out of the system. Impoverished blood is another source of fatigue, since such blood does not carry sufficient nutriment to the muscles to permit them to work normally. That is why an anaemic person tires more easily than one whose blood is rich. Fatigue is a warning that the body needs rest.

PHYSIOLOGY

Digestion

1. Begins in the mouth by means of the saliva.
2. In the stomach the food is mixed with the gastric juices, the albumens changed into soluble peptones.
3. Average time occupied in digestion from three to four hours.
4. Intestinal juices complete the work, and chyle, the digested food, is ready for absorption.

Bones

1. Constitute the framework of the body.
2. Protect vital organs such as the heart and lungs.
3. Consist of 34 per cent animal matter, and 66 per cent mineral substances.
4. Reach their perfection in the temperate zones between the ages of 20 and 25. From that to 50 change slightly, and after that grow thinner and more brittle.
5. Covered by a firm membrane called the periosteum.

Muscles

1. Make up one-half the weight of the body. The organs of movement.
2. Involuntary muscles those not under the control of the will. Receive their nerves from the sympathetic system.
3. Voluntary muscles. In bundles of fibers, an inch in length. Penetrated by nerves from the cerebro-spinal system, under the control of the will.

Nervous System

1. Cerebro-spinal system.
   a. Includes brain, spinal cord and nerves branching out from them.
   o. The brain, the center of the nervous system and seat of consciousness. Weight of brain of the average male European about 50 ounces, that of the female, 45 ounces. The largest brain known, that of Cuvier, about 64 ounces. The substance of the brain, gray and white tissue.
   c. The spinal cord, a mass of nerve matter about 18 inches long.
2. The Sympathetic system.
   a. A series of ganglia, extending from the head, through the neck, thorax, abdomen, to the pelvis.
   b. The nerve centers of the head, by nerve fibers, control the pupil of the eye.
   c. The organs of special sense bring to their brain centers impulses, and the result is sight, hearing, touch, taste, smell, etc.

Respiration

1. The objects of respiration are to supply the necessary oxygen, and carry off the carbon dioxide.
2. The quantity of air in each act of respiration, from 20 to 30 cubic inches.
3. The quantity which cannot be expelled, but remains in the lungs, about 100 cubic inches.
4. About 686,000 cubic inches pass into and out of the lungs of an adult every 24 hours.

CIRCULATION

Heart

1. A hollow muscular organ which forces the blood through veins and arteries.
2. Has four chambers, two auricles and two ventricles.
3. Suspended in the chest by large blood vessels, is about five inches long, and its average weight in an adult from 9 to 10 ounces.
4. In 1628 Harvey pointed out the connection between the heart, arteries and veins, the reverse directions taken by the blood in the different vessels, the valves in the heart and veins.

Arteries

1. The system of tubes which carry the blood from the heart to all parts of the body.
2. The three coats: An outer elastic one; a middle muscular one which contracts and forces the blood along; an inner smooth one that the blood may move easily.
3. Arterial blood leaves the left ventricle of the heart, passes through the capillaries, giving up oxygen and taking carbonic acid, returning to the heart by the veins through the right auricle.

Capillaries

1. The fine blood vessels which connect the arteries with the veins.
2. Some so small that but one blood corpuscle at a time can pass through. They are smallest in the brain.
3. In certain organs they divide and subdivide, forming a network.
4. Capillary walls are thin, composed of but one layer of tissue.
5. Through them the blood receives waste products and gives up nutritious material.

Veins

1. A system of tubes for the purpose of returning the impure blood to the heart and lungs, after it has been carried to the various parts by the arteries.
2. They originate in the capillaries as tiny tubes, and as they unite they decrease in number and increase in size.
3. The two large veins empty into the right auricle of the heart.
4. Like the arteries they have three coats.
5. The valves are arranged in pairs, and prevent the blood from going backward.

formance of its various functions that almost instinctively we become negligent in its care, assuming that so wonderful a machine has within itself such powers of recuperation that special care is not needed to keep it in perfect condition. It we indulge this view of the case we are in serious error, although it is true that the body will stand more abuse and show fewer signs of damage than any other machine or organism. These are only surface indications, however.

Some Effects of Wrong-Doing. The skin contains more than two million openings, and each opening is the outlet of a sweat gland. Each sweat gland is designed as a river to carry off waste matter of the body; each perspiratory duct is nearly one-quarter of an inch in length, and they have a total length in the body of nearly nine miles; yet by refusing to bathe regularly countless millions of people dam up these rivers of health.

The full capacity of the lungs is nearly 320 cubic inches. These lungs must be fed with pure air, the life-giving principle of which is oxygen; yet we will work and we will sleep in rooms in which there is practically no circulation of air, and we starve our lungs and poison ourselves by breathing over and over again the air which the lungs have already expelled as unfit for further service. Scientifically stated, the exhalation from the lungs is carbonic acid gas, poisonous to animal life. Regular breathing is at the rate of eighteen times per minute, and each hour there is inhaled about 3,000 cubic feet; in the course of one hour, therefore, the exhalations of impure air are about 375 hogsheads, for the quantity of air exhaled is equal to the amount inhaled. A simple problem in arithmetic will demonstrate how deadly the air in a closed room will soon become.

The stomach daily produces nearly ten pounds of gastric juice for the digestion of food. This is ample if we eat properly, masticate thoroughly, and do not overload the stomach. Surely that organ is made to suffer when loaded beyond proper capacity and unable to provide sufficient digestive fluids to care for what is consigned to it.

Three-fourths of the weight of the human body is water and one-fourth is animal matter. There is rapid absorption of liquids to all the parts of the body, resulting in the sensation we know as thirst, which is simply the call of the body for more liquid. The only drink a person needs is pure water, yet immense industries with fabulous sums of money in capital exist throughout the civilized world to provide harmful and even dangerous drinks and stimulants to take the place of pure, free water. One of the reasons for the study of physiology is that the laws of practically every state demand that the child be taught the evil effects of strong drink upon the tissues of the body. Probably too little practical teaching is done along this particular line. No other one thing contributes more to keep the body in health than to drink plentifully of good water; there is nothing so detrimental to the health of a man and so destructive of muscular, digestive and nervous tissue as strong drink.

How to Study Physiology. This subject should be studied from a most practical point of view if results are to repay the time spent. Our knowledge of physiology is gained by observation, experiment and the study of our own bodily conditions, and a portion of this information can be gained quite easily from text-books. What we learn is of value from an educational standpoint, and, as well, from the standpoint of health. We learn to care for the body, to prevent disease and to develop powers which will build up better physiques and contribute to greater length of life. Every home and every school should be the center of such investigation.

Related Articles. Below are listed the subjects treated in these volumes that are directly related to the subject of physiology. Attention is also directed to the topics listed at the end of the articles Disease and Medicine.

Abdomen
Absorbents
Absorption
Adenoids
Alimentary Canal
Anatomy
Aorta
Arm
Arteries
Assimilation
Axis
Beard
Biceps
Bile
Blood
Blushing
Bone
Brain
Breathing
Capillaries
Cartilage
Cell
Cerebellum
Cerebrum
Chest
Chyle
Chyme
Cilia
Circulation
Color Blindness
Connective Tissue
Cough
Diaphragm
Digestion
Ear
Embryo and Embryology
Eye
Face
Fat
Fatigue
Fatty Degeneration
Fibrin
Fletcherizing
Food
Foot
Gall Bladder
Ganglion
Gastric Juice
Glands
Hæmoglobin
Hair
Hand
Headache
Health
Heart
Hemorrhage
Hiccough
Intestines
Joints
Jugular Vein
Kidneys
Lachrymal Glands
Lacteals
Larynx
Ligament
Liver
Lungs
Lymph
Lymphatics
Mastication
Membranes
Mouth
Mucus
Muscle
Muscle Sense
Nails
Nerves
Nerves, Cranial
Nervous System
Nose
Nutrition
Palate
Pancreas
Pelvis
Peptones
Pericardium
Peritoneum
Perspiration

Pharynx	Sleep	Tissues
Pleura	Smell	Tongue
Pulse	Snoring	Tonsils
Reflex Action	Spinal Cord	Touch
Saliva	Spleen	Trachea
Scalp	Starvation	Urine
Secretion	Stomach	Veins
Senses, Special	Taste	Villi
Serous Membranes	Teeth	Vision
	Tendons	Voice
Skeleton	Thirst	
Skin	Thoracic Duct	

PIAN'O, or **PIAN'OFORTE**, a musical stringed instrument. The strings are extended over bridges, resting on a thin wooden vibrating sounding board, and are made to vibrate by means of small felt-covered *hammers,* which are put in motion by levers connected with *keys,* pressed by the fingers of the performer. There are also *dampers,* which deaden the sound after the note is struck.

The name *pianoforte* is compounded of two Italian words, signifying *soft* and *strong;* it was so called by the inventor to emphasize the difference between it and its immediate predecessor, the harpsichord, an instrument which had no mechanism for modulating the tone.

The mechanism by which the movement of the piano keys is conveyed to the strings is called the *action,* and in no part of the instrument is careful adjustment of parts more necessary, in order to produce an agreeable and firm quality of tone. When these parts are correctly adjusted, a skilful performer, by carefully controlling the force with which he strikes the keys, as well as the manner of striking, can produce tones of widely different quality, to accord with the purpose and meaning of the composition. There are usually three strings for each note in the higher and middle octaves; for the lowest notes, one, and for intermediates, two. The strings are of steel wire. The strings of the lowest notes are wound with a double coil of brass wire, and those next above are wound with single coil. All pianos have two *pedals* and some have more. These are worked by the feet, and when pressed down, by moving the hammers or dampers, with relation to the strings, they regulate the intensity of the stroke of these mechanisms and consequently control the quality and intensity of the sound. The compass of pianos is six and seven-eighths or seven octaves.

The invention of the piano can scarcely be ascribed to any one man. A grand piano embodying the fundamental principles of the pianoforte was made by an Italian of Padua, Bartolommeo Cristofori, in 1711. It was nearly seventy-five years before any noteworthy improvement was made; then in 1783 an Englishman named Broadwood invented pedals. The first upright piano, made in 1800, was the invention of another Englishman, John Isaac Hawkins. Among the principal improvers of the pianoforte are Sebastian Erard, the founder of the celebrated firm still in existence; Roller et Blanchet, the French firm, which introduced the upright piano; Collard, Bechstein; Steinway, and many others.

PIANOPLAYER, an instrument designed for playing a piano automatically. There is a little hammer opposite each piano key, except those at the extreme ends of the keyboard, the hammers being operated by air pressure, produced by a bellows operated by the feet of the performer. The action of each hammer depends upon the suction of air into its tiny compartment, the suction being regulated by the passage of a sheet, previously perforated to correspond to a selection of music, over a row of tiny openings. By means of levers and strings the time of the music, as well as the intensity and duration of the tone can be regulated. The roll automatically rewinds when the selection is finished.

The *autograph piano* reproduces in minutest detail the performance of an individual artist by means of autograph, or perforated, rolls prepared by a secret process, which render unnecessary the devices on the piano player which control the personal interpretation by the operator.

PIAS'TER, or **PIAS'TRE**, the monetary unit of Turkey, a silver coin equivalent to about 4⅔ cents of American money. Silver half-*piasters,* copper *piasters* (equivalent to $\frac{1}{10}$ the silver *piasters*), copper *paras* (equivalent to $\frac{1}{40}$ of the silver *piaster*), silver 20-*piasters,* gold 25-*piasters,* gold 100-*piasters* and gold 500-*piasters* are also coined. The same name is applied to coins of other nations. The Egyptian *piaster* is about one one-hundredth of the English pound sterling, or about five cents. The Spanish *piaster* is the same as the *peseta.*

PICCOLO, *pik'o lo,* a small flute. It has the compass of the ordinary flute, but the notes all sound an octave higher than they are written. The piccolo is made in three keys C, D flat and E flat. It is indispensable in certain orchestral compositions, and in

much band music its notes are unmistakable. One of the stops of the pipe organ is called piccolo.

PICK'EREL, the name applied to a number of species of the smaller fish belonging to the pike family. They have large mouths and long, slender bodies. The species best known in North America are the *banded* pickerel, occurring in the eastern part of the United States from Massachusetts to Florida; the *little* pickerel, found in the Mississippi Valley, and the *Eastern* pickerel, found in lakes and streams in the Eastern and North Central states. This pickerel may attain a length of three feet. It is a stubborn fighter when caught with a hook, and furnishes good sport for anglers. The flesh is firm and of good flavor.

PICK'ETT, GEORGE EDWARD (1825–1875), an American soldier, born in Richmond, Va. He graduated at West Point and served with distinction in the Mexican War, also on the Western frontier, but at the opening of the Civil War he resigned from the army and became a major in the Confederate service. He rendered distinguished service in the Peninsula campaign, was promoted to the rank of major-general, fought at Fredericksburg and led the famous charge at Cemetery Ridge in the Battle of Gettysburg. During the remainder of the war he held numerous important commands, and at its close he engaged in business in Richmond.

PICKLES, *pik'lz*, vegetables and certain fruits steeped in strong brine and preserved in vinegar, served as a condiment or delicacy to whet the appetite and to add spiciness to food, especially to meat and fish courses. Owing to the corroding effects of brine and vinegar, the use of metallic vessels should be avoided in the making of pickles. Vegetable pickles are made from cauliflower, cucumbers, tomatoes, gherkins, onions, mushrooms, and nasturtium seeds. *Piccalilli*, or Indian pickle, is a mixture of various vegetables and spices pickled together. *Chowchow*, similar to it, has the addition of mustard. The popular *dill pickle* is a cucumber pickle flavored with dill. Because of its large quantity of water, the food value of the pickle is low.

PIC'RIC ACID, a solid acid produced by the action of nitric acid on organic substances. For commercial purposes it is produced by adding nitric acid to a mixture of carbolic acid and sulphuric acid. It is used chiefly in the manufacture of high explosives. The acid colors animal fibers yellow, but does not act on vegetable matter; it has been used to test fabrics suspected of containing cotton, also as a dye for silk.

PICTS, the name given to the ancient Caledonians, usually regarded as a Celtic race, inhabiting North Britain till the beginning of the sixth century.

PIEDMONT, *peed'mont*, a territorial department of Italy, in the northern part of the kingdom. It embraces the provinces of Cuneo, Novara, Turin and Alessandria, and is bounded by France, Switzerland, Liguria and Lombardy. The area is about 11,300 square miles. It lies in the upper valley of the Po and derives its name, which means *foot of the mountain*, from its position at the base of the loftiest ranges of the Alps, which enclose it on all sides except toward the Lombard plain. It is one of the most fertile and beautiful regions of Europe, undulating in slopes and terraces to the plains of the Po. It produces, extensively, wheat, maize, rice, hemp, sugar beets and fruits and large quantities of silk. It has a population of about 3,424,450. Piedmont formed the most important part of the kingdom of Sardinia. See SARDINIA, KINGDOM OF.

PIEDMONT, *peed'mont*, **REGION**, a plain lying along the Atlantic coast in the United States between the Appalachian Mountains and the low coastal plain proper. It is more rugged than the latter, contains harder rock strata and is separated from it by a clearly marked line of escarpments over which most of the rivers which cross it on their way to the Atlantic fall in cataracts or rapids. This line is known as the "fall line." The Piedmont plain is broadest in North Carolina, where it attains a breadth of 300 miles and is more clearly defined than in the Middle Atlantic and New England states. The word *Piedmont* is from the French and means *foot of the mountains*.

PIER, *peer*, in architecture, the name applied to a mass of masonry between openings in a wall, such as doors or windows, and to the solid support from which an arch springs or which sustains a tower. In medieval architecture the pier was a square column. The term is also applied to a mole or jetty carried out into the sea, intended to serve as an embankment to protect vessels from the open sea and to form a harbor. In buildings the term is used to designate the column with base, shaft and capital.

PIERCE, FRANKLIN (1804–1869), an American statesman, the fourteenth President of the United States. His administration was notable for the repeal of the Missouri Compromise and the birth of the Republican party—the party that was destined to shape the nation's policies for many years afterward. The Missouri Compromise, passed in 1820 and designed to set a limit to the extension of slavery in the states, became inoperative in Pierce's administration by the passage of the Kansas-Nebraska Bill. As a result, the slavery issue was reopened, and the nation was plunged into a controversy that ended in civil war.

Franklin Pierce was born at Hillsborough, N. H., on November 23, 1804. He was the son of a man who had fought as an officer in the Revolutionary War and had served two terms as governor of New Hampshire. Franklin attended Bowdoin College from 1820 to 1824, and formed there a notable friendship with Nathaniel Hawthorne. After his graduation he studied law, and in 1827 was admitted to the bar. His inclinations, however, led him to enter political life, and between 1829 and 1832 he was four times elected by the Democrats to the New Hampshire legislature, being speaker for two terms. In 1832 he was sent to the national House of Representatives, retaining his seat in the election of 1834. Pierce had the honor of being the youngest member of the United States Senate when the New Hampshire voters elected him to that body in 1837. He was then but thirty-three years of age.

FRANKLIN PIERCE

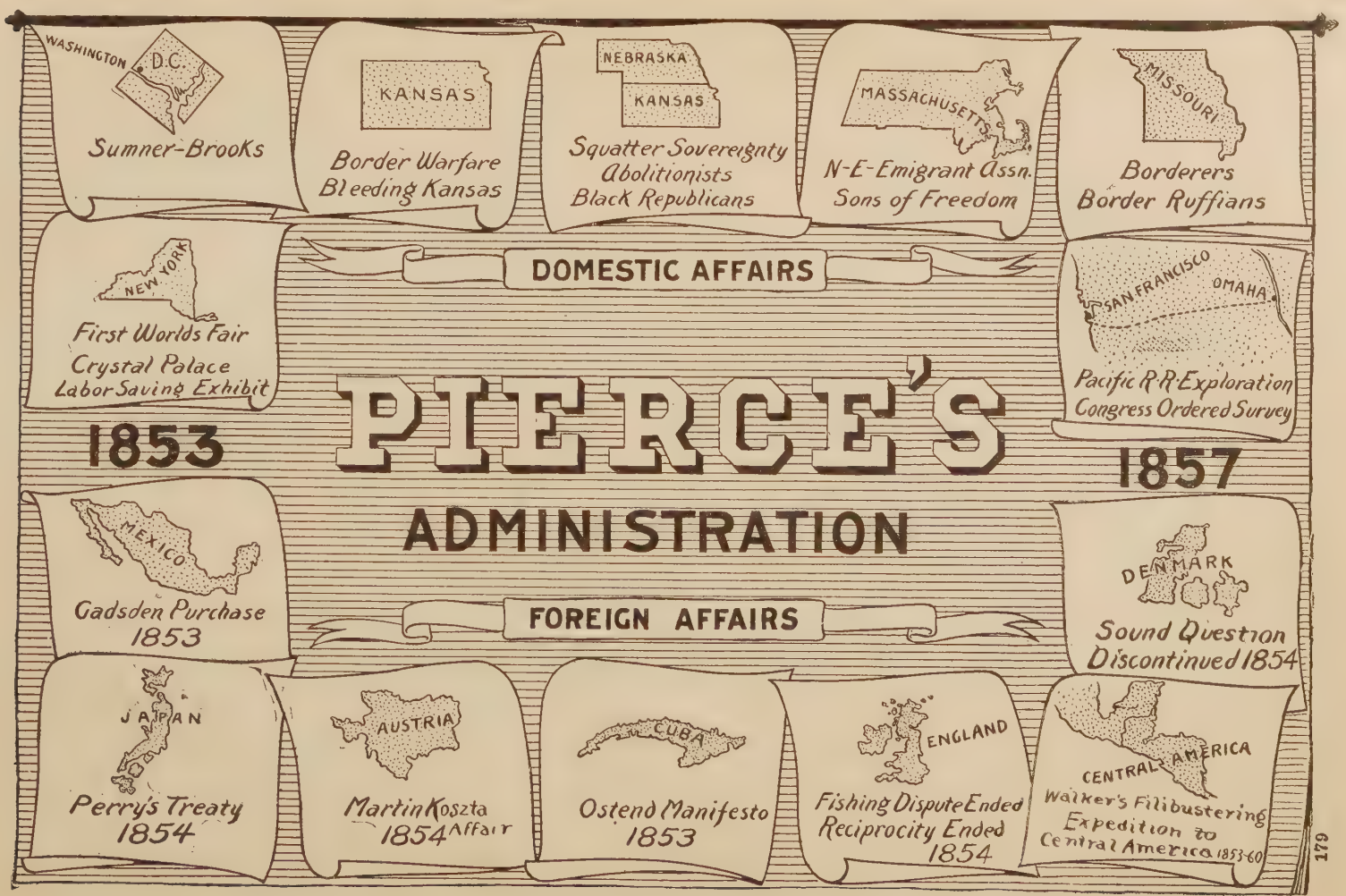
The young Senator from New Hampshire became an associate of such eminent political leaders as Webster, Calhoun and Clay, but though he did not equal them as a national figure, he created a good impression by his independence and sincerity. Pierce was an honest supporter of the Jackson and Van Buren policies, but he refused to uphold the doctrine, "to the victor belong the spoils," inaugurated in Jackson's administration. Resigning from the Senate in 1842, he took up law practice, and for five years remained out of politics, though several offices of importance were tendered him. When the Mexican War became a certainty he volunteered as a private. President Polk soon commissioned him a colonel, and later made him brigadier-general of volunteers, after which he helped in the fighting at Contreras and Churubusco.

Between 1848 and 1862 Pierce engaged in law practice at Concord, N. H., and as he did not identify himself with any of the factions of his party, the Democrats looked upon him as a safe candidate for the Presidency. The convention which nominated him adopted a resolution pledging the party to carry out faithfully the Compromise of 1850. In the election Pierce won over the Whig candidate, General Scott, by an electoral vote of 254 to 42.

His Administration. The passage of the Kansas-Nebraska Bill, early in 1854, was the first important event touching on domestic policies. It embodied the pet theory of Senator Stephen A. Douglas of Illinois that new territories should decide the slavery question for themselves. This squatter sovereignty doctrine, as it was called, had a demoralizing effect that would have been foreseen by a broader-visioned man than President Pierce. It made Kansas a bloody battleground and stirred public passions to a high pitch. Bitter speeches were made in Congress, and the North was roused to a frenzy by a brutal attack on Senator Charles Sumner by Representative Preston S. Brooks of South Carolina. In the midst of the storm and stress the Republican party held its first national convention in Philadelphia, in June, 1856.

President Pierce, aided by his efficient Secretary of State, William L. Marcy of New York, pursued a vigorous foreign policy throughout his administration. In 1853 Captain Ingraham of the United States steamship *Saint Louis* forced Austrian authorities to release Martin Koszta, an Hungarian refugee who had previously sought protection in the United States, but had returned to Europe before complying with all the formalities of naturalization. The favorable attitude with which the administration regarded Ingraham's action was characteristic of the President's attitude on all matters touching American dignity.

In 1853 the Mexican boundary question was settled by the Gadsden Purchase, and in


WASHINGTON D.C.
Sumner-Brooks
KANSAS
Border Warfare
Bleeding Kansas
NEBRASKA
KANSAS
Squatter Sovereignty
Abolitionists
Black Republicans
MASSACHUSETTS
N-E-Emigrant Assn.
Sons of Freedom
MISSOURI
Borderers
Border Ruffians
DOMESTIC AFFAIRS
NEW YORK
First Worlds Fair
Crystal Palace
Labor Saving Exhibit
SAN FRANCISCO
OMAHA
Pacific R.R. Exploration
Congress Ordered Survey
1853
PIERCE'S
ADMINISTRATION
1857
MEXICO
Gadsden Purchase
1853
FOREIGN AFFAIRS
DENMARK
Sound Question
Discontinued 1854
JAPAN
Perry's Treaty
1854
AUSTRIA
Martin Koszta
1854 Affair
CUBA
Ostend Manifesto
1853
ENGLAND
Fishing Dispute Ended
Reciprocity Ended
1854
CENTRAL AMERICA
Walker's Filibustering
Expedition to
Central America 1853-60

Administration of Franklin Pierce, 1853-1857

I. The President
- (1) Birth
- (2) Parentage
- (3) Youth
- (4) Education
- (5) Character
- (6) Public life
- (7) Death

II. Governmental Affairs
- (1) Domestic
  - (a) Inaugural address
    - (1) A statement of policy
    - (2) Effect on the people
  - (b) Kansas-Nebraska Act
    - (1) Doctrine of popular sovereignty
    - (2) Terms of the Act
    - (3) Object
    - (4) Results
      - (a) The fight for Kansas
        - (1) Topeka Convention
        - (2) Lecompton Constitution
        - (3) Border and Civil War
      - (b) Attack on Sumner
      - (c) Organization of republican party
      - (d) Increased agitation
- (2) Foreign
  - (a) Case of Martin Koszta
    - (1) Seized by Austrian authorities for part in rebellion
    - (2) Protest of the United States
  - (3) Koszta freed
  - (b) Ostend Manifesto
    - (1) Issued by United States ambassadors
    - (2) Declared acquisition of Cuba desirable
  - (c) Gadsden Purchase
    - (1) By whom negotiated
    - (2) Price
    - (3) Object
    - (4) Result
  - (d) Trouble with Spain
    - (1) Due to filibusters in Cuba
    - (2) President's attitude
    - (3) Southern leaders opposed acquisition of Cuba
  - (e) Treaty with England
    - (1) Ended dispute about fisheries
    - (2) Reciprocity with Canada
  - (f) Treaty with Japan
    - (1) Negotiated by Perry
    - (2) Opened Japan to American Commerce

III. Internal Affairs
- (1) Yellow fever epidemic in New Orleans
- (2) Crystal Palace Exhibition

IV. The Campaign of 1856
- (1) National conventions
- (2) The issues
  - (a) Popular sovereignty
  - (b) Kansas
- (3) The candidates
- (4) Significance of the election of Buchanan

Questions on Pierce

When was Franklin Pierce born?

What college did he attend? Who were some of his classmates?

Explain the doctrine of popular sovereignty.

Who was its greatest exponent?

What did he seek to accomplish by the Kansas-Nebraska Act?

In what way was it a violation of the Missouri Compromise?

How was it received by the North? By the South?

Who attacked Charles Sumner? Why?

What was the Lecompton Constitution?

Who was John Brown?

What different elements made up the new Republican Party?

What was the Ostend Manifesto, and why so called?

1854 a treaty was negotiated which adjusted an old dispute with Canada over the Atlantic fisheries. The American minister at Madrid came close to involving the country in a war with Spain over the question of Cuban annexation, and relations also became strained with England because the British minister at Washington was apparently undertaking to obtain recruits for the Crimean War. In each case, however, trouble was averted. In connection with the Cuban complication the famous Ostend Manifesto was issued. Other notable events touching on foreign relations were the expedition of Perry to Japan, whereby Japanese ports were opened to trade, and the filibustering adventure of William Walker in Nicaragua.

President Pierce was not a candidate for reëlection, and at the end of his term he retired to private life. Several years were spent in European travel. He died in October, 1869, and was buried at Concord, N. H. He is regarded by historians as an honest, capable official, but not as a great statesman.

Related Articles. Consult the following titles for additional information:

Gadsden Purchase	Perry, Matthew C.
Kansas (history)	Republican Party
Kansas-Nebraska Bill	Squatter Sovereignty
Ostend Manifesto	Walker, William

PIERRE, *peer*, S. D., the capital of the state and the county seat of Hughes County, is 150 miles up the Missouri River from Yankton, the old territorial capital. The river is not considered at all important for navigation in this part of its course. The surrounding country is rich in undeveloped resources. The Chicago & North Western Railroad was built to the city in 1883, and extended westward in 1907. There is a Federal building, a fine state capitol (See South Dakota), an imposing railroad station, a Carnegie Library and a large hotel. The commission form of government was adopted in 1909. Population, 1910, 3,656; in 1917, practically unchanged.

PIGEON, *pij'un*, the name of a large group of birds found in all parts of the world, of which the dove is the best representative. Most pigeons are of medium size, and the plumage of those in the temperate regions is of a dull gray or brown or black, frequently having a metallic luster. The pigeons of the tropical regions, however, have brilliant colors. Pigeons seem to be the most defenseless of birds. They build flimsy nests in exposed places, and suffer from attacks of birds and other animals. The birds pair for life, and the nest contains two eggs upon which the male and female sit in turn until they are hatched. Some pigeons live in colonies, and some in isolated pairs. There are hundreds of varieties, but only a few are of general interest.

Passenger Pigeon. This pigeon formerly existed in the eastern part of North America in countless numbers, but owing to the activity of hunters it is now practically extinct. It is a beautiful bird about fifteen inches in

PASSENGER PIGEON

length, with delicately tinted plumage, small head and long tail and wings. No more ruthless crime was ever committed against bird life than the extermination of the beautiful passenger pigeon.

Mourning Dove. The only representative of the passenger pigeon family now remaining. It is a small pigeon and takes its name from its long, plaintive *coo-o-o*, which is its song, and not a note of wailing, as many suppose. The *turtle dove* frequently mentioned in the Bible is the Eastern representative of the species.

Other Species. The *fantails* are so named because of their large, erect tails, which open like a fan. The *pouters* have large crops which give them a grotesque appearance. The *Jacobins* have a ruff of feathers about the neck. The *tumblers* turn somersaults in the air during flight. The *homing pigeons*, also called *carrier pigeons*, have a remarkable sense of direction. See Carrier Pigeons.

PIGMENTS. See Paint.

PIG'WEED, a plant belonging to the amaranth family, native to tropical America, but now a common pest in the United States, thriving in almost any kind of soil. It has dull, green leaves and crowded spikes of small greenish flowers. The plant is tall and

straight, and is without spines. It is often called *beetroot,* because of its red root.

PI'KA, a little animal which lives at high altitudes in Asia, Europe and the western part of the United States. It is sometimes called *cony, calling hare* and *little chief hare,*

CALLING HARE

although it resembles a guinea pig more than a hare. The American species is about seven inches long and has only a rudimentary tail. Its fur is a dirty black, but lighter beneath. The animals live above the timber line, in large communities, usually in piles of loose débris, advertising their presence by a chorus of squeals. They are vegetarians, and providently store up grass, hay and vegetables for winter bedding and fodder.

PIKE, the name of a group of fishes found in the waters of Europe and North America, and belonging to the same family as the perch. The *wall-eyed pike,* common in America from Lake Champlain westward to Saskatchewan, Canada, is the best known species, and is highly prized. It is found in greatest abundance in Lake Erie. It is also known as the *yellow pike* and the *dory,* a name applied to it by the French Canadians. In some localities this fish is wrongly called a *pickerel.* It is one of the most important fishes propagated by the United State Fish Commission.

Another species, the *sauger,* is found from the Saint Lawrence River westward through the Great Lakes. It is a game fish worthy of the skill of the most experienced anglers. See PERCH.

PIKE, ZEBULON MONTGOMERY (1779–1813), an American soldier and explorer, for whom Pike's Peak, in Colorado, was named. He was born at Lamberton, N. J., and was taken in childhood to Eastern Pennsylvania, where he later entered the army, becoming first-lieutenant in 1800. Five years later he led an exploring expedition into the territory of the Louisiana Purchase. In 1806 he ascended the Missouri River and the Osage into the present state of Kansas, thence southward to the Arkansas River, which he ascended to the site of Pueblo, Colo., discovering Pike's Peak. Pike was captured by the Spanish while searching for the Red River, but was later released. He was promoted through various ranks to that of colonel, and was nominated brigadier-general, but died before this commission had the Senate's confirmation. He was killed by an explosion in the expedition against York, Canada, in the War of 1812. He was the author of *An Account of an Expedition to the Sources of the Mississippi and Through the Western Parts of Louisiana, and a Tour through the Interior Parts of New Spain.*

PIKE'S PEAK, best known of the Rocky Mountain peaks in Colorado. Its snow-capped summit rises 14,108 feet above sea level. Pine forests cover its slopes to a height of almost 12,000 feet. Above this it consists of barren granite rocks. A rack-and-pinion railway, built in 1891, ascends to its summit, where a magnificent, widely-extended view of the great plains and mountains has awed thousands of visitors every summer. A postoffice and little curio shop are found on the summit. A searchlight which plays upon the environs adds much to their impressiveness and majesty.

PILAS'TER, in architecture, a square pillar, protecting from a pier or a wall to the extent of from one-fourth to one-third of its breadth. Pilasters originated in Grecian architecture. In the Roman, they were sometimes tapered like columns and finished with capitals, modeled after the order with which they were used. In the early Renaissance ornamented pilasters were very common. See COLUMN.

PI'LATE, PONTIUS, the Roman procurator of Judea, Samaria and part of Indumea from A. D. 26 to 36. He misunderstood, and was misunderstood by, the Jews, whose complaints led ultimately to his recall to Rome. Pilate is conspicuous in history in connection with the trial and crucifixion of Jesus. He examined Jesus and was convinced that he was not politically dangerous, but feared to oppose the people (see *Matthew* XXVII). Pilate was removed from his office by Vitellius prefect of Syria, in A. D. 36, and, according to tradition, was later banished by Caligula to Gaul, where he died some years afterwards.

PILCOMAYO, *peel ko mah'yo,* a shallow river of South America, rising in Bo-

livia on the eastern slope of the Andes, and flowing southeast until it joins the Paraguay near Asuncion, after which it forms a part of the boundary between Paraguay and Argentina. The Pilcomayo has not yet been thoroughly explored, and its length is estimated at 1,200 miles. Because it is so shallow during the dry season and has such strong currents in its narrow places, the Pilcomayo will never attain great commercial value.

PILE, a long post sharpened at one end and driven into soft earth to support a building or to make a defense against water. In the former case a pile is usually a pointed log of wood, which sometimes is protected with an iron shoe, to enable it to penetrate the harder strata of the earth. Piles are most generally used in temporary structures to make cofferdams (see COFFERDAM). The piles now used are often of concrete.

PIL'GRIMS, the name first applied by Governor William Bradford to the body of English Separatists who established the first English settlement in Massachusetts, at Plymouth, Mass., in 1620. He referred to the colonists as "pilgrims and strangers upon the earth." Because they separated from the Church of England they were known as *Separatists,* and their first churches were at Gainsborough and Scrooby. Driven from England by persecution, in 1608 they established themselves at Amsterdam and Leyden, Holland, and in 1620 emigrated to America. They are also known as the "Pilgrim Fathers." See PLYMOUTH COLONY; MASSACHUSETTS, subhead *History.*

PILLORY, *pil'o ri,* an instrument of punishment in former times. Two boards, placed with the long, narrow faces together and joined by hinges, were mounted, their ends vertical, upon a post supported by a platform. A hole in the center of this upright board held the culprit's neck, and one on each side his wrists. In early times the pillory was used as a punishment for forgery, perjury and other dishonorable offenses. Later, milder offenses were punishable in this manner, and many eminent men were, for libel, for publishing books without license and such indiscretions, exposed to public ridicule. The pillory was introduced into the American colonies from England and was used to punish such offenders as drunkards and scolds. It was abolished by law early in the nineteenth century.

PI'LOT, a person qualified by experience and licensed by law to navigate a vessel within a particular district. In some ports each ship on entering and leaving is compelled to accept a port pilot to direct navigation. In the United States the power of regulating usage with respect to pilots is in the hands of Congress; however, several states pass laws for their own respective territories, in accord with the national laws governing the subject.

PILOT FISH, a fish belonging to the mackerel family. It is silver gray in color, and its body is encircled by five blue-black bands. The fish is about a foot long, and is more or less round. The name is probably attributable to the fish's habit of swimming before ships. This fish is a natural friend of the shark, which it often accompanies, picking up the bits of food its companion overlooks, and, for the time being, quite safe in such company from attack of its enemies.

PIMA, *pe'ma,* one of the principal Indian tribes living in Southern Arizona and Northern New Mexico. They are a peaceful tribe, their wars in almost every instance having been fought in defense. They are agricultural in habits, fertilizing their fields by means of extensive irrigation canals. The women are especially adept in weaving water-tight baskets and in making pottery. Once they were Pueblo Indians, living farther north, but having been driven south, they built small, dome-shaped dwellings of brush covered with earth and straw. They are very strong, industrious, and are noted for their honesty. There are at present about 4,200 Pimas.

PIMENTO, *pi men'toh,* a subtropical tree of the myrtle family, from the dried berries of which is prepared an important commercial spice known as allspice, Jamaica pepper, or pimento. The tree, which is an evergreen, grows to a height of twenty-five feet or more. The glossy, black berries, which follow the small white flowers, are gathered before maturity and prepared for the market. The pimento is a native of the West Indies and is extensively cultivated in Jamaica, which produces most of the allspice of commerce. See ALLSPICE.

PIN. We never place any value on a pin until we need one, and then we wonder how people once existed without such a convenience. Over 47,339,000 gross of common

toilet pins are made in the United States yearly, and in addition to these there are manufactured 1,200,000 gross of hairpins and 1,640,000 gross of safety pins, not to mention millions of hatpins.

Pin Making. Pins are made from brass wire (see WIRE). The wire is wound on a large reel, which is hung over the pin-making machine. In this machine the pin is cut from the wire, headed, pointed, sharpened and polished. This machine is a combination of steel fingers, rollers, cams, toggle joints, headers, revolving files and belts. The wire, caught by a pair of rollers, is drawn forward into the machine where it is cut into the right lengths; two raps from a cam and toggle form the head. A steel finger puts the headed wire on a wheel under the heading dies, and the pointless pin is carried down between two revolving steel disks. One of them revolves faster than the other, so the pin is turned round as it travels forward. Just at this point, it comes in contact with four revolving files, which point the pin, and then an emery belt puts the first polish on it. The pins drop from the machine at the rate of 160 a minute and fall into a hopper, from which they are taken to the tinning room. In passing from the pin machine, the pins become covered with oil and dirt, and this is removed by putting them into a revolving iron barrel, with sawdust. The tinning process consists in the pins being boiled for four hours in a preparation of pure tin. They are then washed with strong soapsuds, and polished. They are then ready to be stuck into papers.

The sticking machine crimps the paper and sticks the pins in at the same time. The pins are put in a hopper from which an inclined steel plate, furrowed with little runs, or channels, leads to the machine. The pins are caught by revolving steel fingers and pushed forward upon the inclined plate into the runs. The runs converge to a plate, which moves slightly back and forth across the rows of slots. This cutting off plate catches the pins, and when the holes are full a number of little rams or hammers shove the pins into the crimp of the paper which is formed a second before the pins are stuck in.

PINCHOT, *pin'sho*, GIFFORD (1865–), an American authority on forestry, born at Simsbury, Conn. He was graduated at Yale in 1889, studied his profession in the principal countries of Europe, and on his return to America began his first systematic forest work at Biltmore, N. C. (1892). He organized, developed, and made possible the great success of the Division of Forestry, of which he was chief from 1898–1910, and he took a prominent part in the conservation movement in the United States. After serving as chairman of numerous committees, he was elected president of the National Conservation Association in 1910. Since 1903 he has been professor of forestry at Yale. Pinchot is the author of *The White Pine* (in collaboration with Prof. H. S. Graves), *The Adirondack Spruce*, and *A Primer of Forestry*. See CONSERVATION.

PINCKNEY, *pink'ni*, CHARLES COTESWORTH (1746–1825), an American statesman, born at Charleston, S. C. In the Revolutionary War he attained the rank of brigadier-general, and after the war practiced law and became a member of the Constitutional Convention of Philadelphia and of the convention that framed the South Carolina constitution. Pinckney was appointed United States minister to France in 1796, and in that post is remembered chiefly for his famous response to Talleyrand's attempt to negotiate a bribe: "Millions for defense, sir, but not one cent for tribute!" (see X Y Z CORRESPONDENCE). Pinckney was twice the unsuccessful candidate of the Federalists for President.

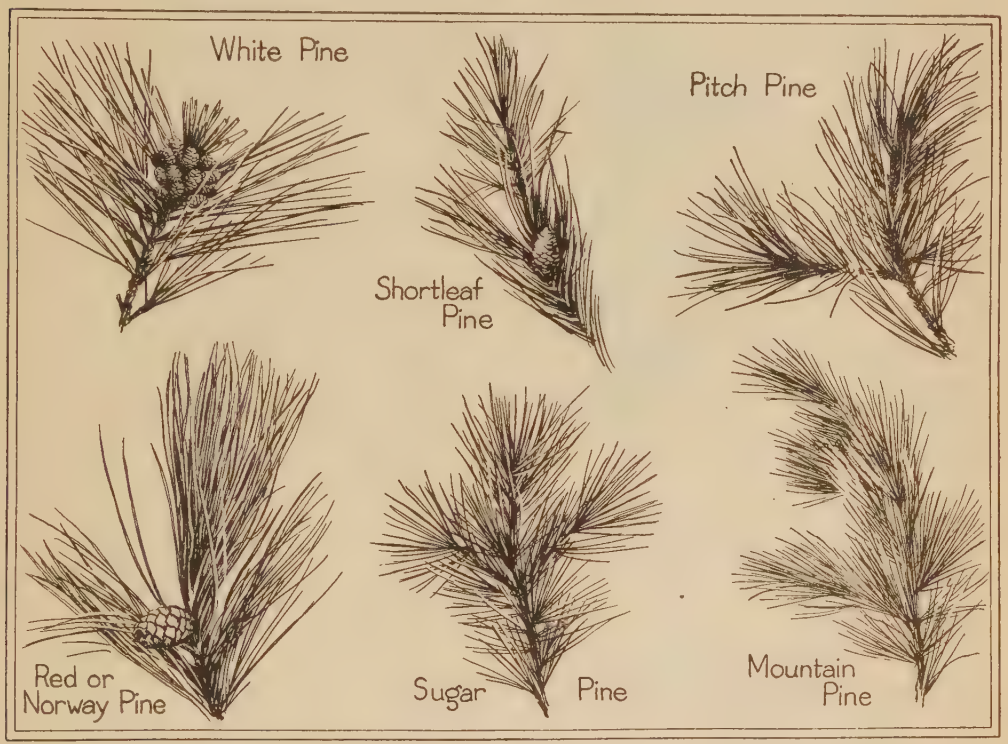
PIN'DAR (522?–445 B. C.), the greatest of Greek lyric poets, was born of a noble family and lived in Thebes. He traveled throughout Greece and, becoming widely known, received many commissions for poems to commemorate and immortalize important events. Choral lyrics, intended to be sung by choruses, hymns to the gods, processional odes, dirges, hymns in honor of the victors of the Olympic, Nemean and other Greek games, were among his productions. His style is simple and majestic. The noble music of his lines cannot be translated, but an admirable English version is that of Myers. Pindar was the first Greek writer to express belief in the immortality of the soul.

PINE, the most numerous trees of the cone-bearing family. There are about thirty-five species found in North America, and nearly as many more are known in other parts of the world. The pine is characterized by its long, evergreen, needle-shaped leaves, which grow from a sheath in clusters of from one to five. Its branches are arranged in whorls and project nearly horizontally. The

bark is reddish-brown, and the wood is fine-grained and adapted to many uses. In accordance with the quality of the wood, pine is classed as *hard pine* and *soft pine*. These varieties are also known as *white pine* and *yellow pine*.

White Pine. The white pine is common from Canada to North Carolina and Georgia, along the Appalachian Mountains and westward to Tennessee. In the northern part of this belt, the trees extend westward to Minnesota, while extensive forests are found in Canada, along the Saint Lawrence and Ottawa rivers as far west as Lake Superior. The tree often attains a large size, being from 70 to 150 feet in height and sometimes having a diameter of seven feet, though trees of this size are rare. The wood is white, soft, fine-grained and durable, and it is the most useful wood in the world for lumber. This tree was the chief source of lumber in the United States and Canada for more than 250 years, but with the exception of the great forests in Idaho, and some forests in Canada, the supply is practically exhausted, and the yellow pine has taken its place for many purposes.

Yellow Pine. The yellow pine or Georgia pine is found in the Southern states, from North Carolina to Florida and westward to the Mississippi, and in detached forests in Arkansas, in some portions of Louisiana and in Texas. The wood is of a color darker than that of the white pine; it is hard and fine-grained and it contains considerable pitch. It forms a strong and elastic lumber and is especially valuable in the construction of ships, bridges, viaducts and frames for large buildings. It is also used for flooring and inside finishing. This tree is also the source of tar, turpentine and resin (see TAR; TURPENTINE).



Sugar Pine. The sugar pine is a large tree, often attaining a height of 250 feet and a diameter of six to ten feet. It is found in the forests of Oregon, Washington and northern California. Its wood resembles that of the white pine, and the tree is a valuable source of lumber. It takes its name from the fact that white sugar crystals form on the wood when it is burned. Among other species are the *loblolly, swamp, bull, silver, red* and *nut*. See LUMBER; FORESTS AND FORESTRY.

PINE'APPLE, a delicious, fragrant tropical fruit common in all markets. The pineapple is a native of South America and the West Indies and was introduced into Europe by the early Spanish explorers. It takes its name from *pinya,* the name of the edible nut of the Spanish pine, which it closely resembles in shape. Ordinarily the fruit is about the size of a cocoanut, but large specimens may weigh from sixteen to twenty pounds. The plant is a biennial. It has long pointed leaves, whose edges are in most species furnished with sharp spines. The leaves are thick and juicy. From the center of the cluster a stem rises two or three feet and bears on its upper end a flower cluster, in the form of a conical spike. Each flower is placed in the axil of a bract, except those near the top, which develop into a cluster of small leaves, which crowns the ripened fruit. The fruit is the thickened fleshy flower stalk, and in this respect, as well as in its odor and flavor, the pineapple somewhat resembles the strawberry. The plant requires a warm climate and abundant moisture. The fruit contains no sugar, but absorbs sugar from the stump in ripening, therefore the flavor of the fruit is greatly improved if it is allowed to ripen before picking. Its hard covering enables the pineapple to withstand more rough usage than any other tropical fruit. It will keep for a long time, and can be obtained throughout the year. These qualities, combined with its delicate flavor, make the pineapple a popular fruit.

PINEAPPLE

Most of the pineapples cultivated in the United States are grown in Florida, where both soil and climate are especially favorable to their production. A few are also grown in Georgia, Texas and Southern California. The finest varieties are grown in Florida under sheds built of lath nailed to frames two or three inches apart, to protect the plants from intense heat and frosts. Most of the canned pineapple consumed in this country comes from Hawaii. Large quantities are also imported from Cuba, Porto Rico and the Philippine Islands. European markets are supplied from Northern Africa, the West Indies, the Azores and the Canary Islands. Australia's supply comes from Queensland. In the Philippines a beautiful fabric called *pina muslin* is woven of a fiber obtained from the leaves.

PINE BLUFF, Ark., the county seat of Jefferson County, forty miles southeast of Little Rock, on the Arkansas River and on the Cotton Belt and the Saint Louis, Iron Mountain & Southern and other railroads. It is in a fertile cotton-growing and timber region, has a large trade in cotton and lumber and contains railroad shops, cotton compresses, cottonseed-oil mills, iron works, large hardwood flooring plants and furniture and other factories. It is the seat of a state normal college for colored students, and the state fair is held here annually. The city has a normal school for colored students, a Federal building, a large hotel and a fine bank building, a courthouse, several fraternal society buildings, and the Merrill Institute. Population, 1910, 15,102; in 1917, 17,777 (Federal estimate).

PINERO, *pin ayr'o,* Sir Arthur Wing (1855–), a dramatist, born in London, of Jewish ancestry. He studied law, but abandoned it for the stage. His successful farces, produced early in his career, include *The Money Spinner, The Magistrate, The Schoolmistress, The Amazons* and *The Cabinet Minister.* After writing *The Weaker Sex, Sweet Lavendar* and other sentimental comedy, Pinero turned to serious drama and produced, among his best plays, *The Second Mrs. Tanqueray, Iris, Mid-Channel, The Benefit of the Doubt* and *His House in Order.* Pinero is a clever craftsman, and his plays abound in witty dialogue.

PINES, Isle of, a small island of the West Indies, thirty-five miles south of Cuba, to which it belongs. It is nearly circular, and embraces an area of about 840 square miles. In the north are wooded hills, where pine, mahogany and cedar trees grow; the southern part is low and marshy. There are numerous mineral deposits, but of these only marble is commercially important. Stock-raising and farming are the chief industries. The delightful climate and mineral springs attract

many tourists to the island. Modern hotels and sanitariums have been built at Santa Fé, one of the larger towns. The principal city is Nueva Gerona, which has a population of 4,000.

PINE-TREE SHILLING, the name given to the largest of several coins issued by the colony of Massachusetts from 1652 to 1682; the others were sixpence and threepence pieces. The obverse side bore the expression *1652, XII,* encircled by the words *New England* and *An. Dom.;* the reverse side had a crude engraving of a pine tree, encircled by the words *Masathusets In.* The weight was about seventy-two grains, and the value equivalent to eighteen and one-fourth cents. The pine-tree shilling figures in Hawthorne's tale of colonial days, *Grandfather's Chair.*

PING PONG, an indoor game based on the principle of lawn tennis. It is played on a table the proportions of a tennis court, and the balls are light hollow celluloid spheres. Light rackets shaped like tennis rackets are used. The score is counted in the same manner as in the outdoor game.

PINK, an exquisite little flower with a spicy odor, a favorite in old-fashioned gardens. The blossoms are commonly pink or white, though the many cultivated species may include other tints. The name *pink* doubtless refers to the fringed edges of the petals, which may be single or double. The plant is about six inches high and has pale green grasslike foliage. Sweet William, Scotch, China, pheasant's eye, grass and feathered pinks are among the popular varieties. A closely related flower is the carnation.

PIN MONEY, in English law, a sum of money periodically paid by the husband to his wife, with which she purchased her dresses and personal adornments. The origin of the term is unknown, although it is generally attributed to the ancient tax levied in England for the purpose of supplying the queen with pins. The practice of providing pin money allowance was at one time quite common among the wealthy of England. It never gained favor in the United States. Pin money was distinguished from gifts in that the latter referred to sums given to the wife voluntarily by the husband without his indicating that they were to be used for certain specific purposes.

PIPE, Tobacco, a small bowl fitted to a hollow stem for the smoking of tobacco. The origin of the pipe is uncertain. Long before they were known to white men, the American Indians smoked pipes with bowls carved from a soft clay rock, and often highly ornamented, and it is probable that some sort of pipe was used in England for smoking medicinal herbs before tobacco was introduced into that country. Pipes are made of clay, corncobs, brier root, meerschaum and a variety of other materials. Meerschaum pipes are largely made in Germany, and many of them are beautifully carved and decorated (see Meerschaum). Whatever the material of which the bowl and stem are made, the best grades of pipes have mouthpieces of silver, porcelain and amber, the last being preferred. To the American Indians the pipe often meant more than relaxation. The smoking of the pipe of peace was often an important occasion. See Calumet.

The Eastern *hookah* is a pipe of great size, the bowl of which is set upon an air tight vessel, partially filled with water; it has a small tube which passes down into the water. The long flexible smoking-tube is inserted in the side of the vessel, and the smoke is made to pass through the water, being thus cooled and deprived of some noxious properties.

PIPE'FISH, a name applied to a kind of salt-water fish, which is related to the curious little animal known as the hippocampus (which see). It has a slender body from two and a half to three feet long, covered with

PIPEFISH

bony plates, and a long tubelike snout, at the end of which is an upturned mouth. The male is equipped with a pouch, in which the eggs, and, later, the young, are carried. This fish feeds on fish eggs and small marine animals, often diving to beds of eel grass, where, with body vertical, its snout foraging in the mud, it can hardly be distinguished from the gently-waving blades of these plants.

PIPE LINES, lines of wrought-iron or steel pipe, joined to form conduits of great length for the transportation of oil and natural gas. The first pipe lines for conveying crude petroleum were laid in 1862, a few years after the discovery of petroleum in Pennsylvania. Owing to defective construction, the joints leaked so badly that these

lines were abandoned. These defects were soon remedied, however, and pipe lines became a common means of conveying crude oil from the wells to the refineries. Some of these lines are 500 or more miles in length. The size of the pipe varies from four to eight inches, the largest size being used for thick oil. The lines extend over hills and through valleys and the oil is forced along on its journey by pumps, which are placed wherever they are needed. It is estimated that there are over 10,000 miles of trunk lines and 80,000 miles of feeders in the United States.

Pipe lines for conveying natural gas are constructed on plans similar to those for conveying oil, the chief difference consisting in the size of the pipe. Gas mains range from sixteen to twenty-four inches in diameter instead of four to eight inches, the size for oil mains. In some instances the pressure of natural gas is sufficient to drive it long distances through the mains, but in most instances the gas has to be pumped. See NATURAL GAS; PETROLEUM.

PIPE OF PEACE. See CALUMET.

PIP'IT, or **TIT'LARK**, an American bird about seven inches long, having a trim, brownish body with dark streaks, and light-edged feathers. The bird lives chiefly on the ground, in open spaces, over which it runs rapidly. Because of its habit of flirting its tail, it is sometimes classed with the wagtails. The pipits spend the winter in the tropics and the summers far north, Labrador being a favorite nesting place. The eggs, lightish gray, with brown spots, are laid in grassy nests on the ground. A near relative of these birds is the Missouri skylark, which, like the true lark, sings on the wing.

PIPIT

PIPPIN. See PEPIN.

PIQUA, *pik'wa*, OHIO, in Miami County, seventy miles southwest of Columbus, on the Miami River, on the Miami & Erie Canal and on the Cincinnati, Hamilton & Dayton, the Pittsburgh, Cincinnati, Chicago & Saint Louis and electric railways. It is in a rich farming region, has good water power and manufactures underwear, stoves, shovels, furniture and strawboard, and has marble works. The city has the Schmidlapp Library, a Federal building and a Y. M. C. A. Population, 1910, 13,388; in 1917, 14,275 (Federal estimate).

PIQUET, *pe ket'*, or *pik'et*, a card game played by two persons, who use all the fifty-two cards in the deck except the twos, threes, fours and fives. Twelve cards are dealt, two or three at a time, to each player, and the remainder of the pack is placed on the table. If a player holds no face cards, he lays his hand on the table for his opponent to see, and scores ten. Then the player opposite the dealer must discard one card, and may discard five cards, and take in place of them an equal number from those that have not been dealt. If he discards less than five, he may look at the first five of the pack and make his selection. The dealer discards or not, as he chooses, but he may take all that the other has left, discarding an equal number from his hand. Authorities differ concerning the rules for discarding. The players score according to certain combinations of cards, which may be learned from any good book on games.

PIRACY, *pi'ra si*, robbery of ships at sea by crews organized especially for the purpose. In the days when they flourished, pirates were the bandits of the sea. Their banner was a black flag, and they owed allegiance to no government. For years piracy has been punishable by death under the law of nations, yet early in the nineteenth century the United States had to fight the Barbary States to protect its ships from the pirates whose depredations were sanctioned by the governments of those states. See PRIVATEER.

PIRAEUS, *pi re'us*, the port of Athens, Greece, situated on a peninsula about five miles southwest of the city. It has three harbors, two on the east and one, the largest, on the west. More than half of the commerce of Greece passes through Piraeus, which is in direct communication with Constantinople, Trieste, Alexandria and Marseilles. The manufactories are important; textiles, leather, paper, macaroni and brandy are among the products. Piraeus was built when Athens became the capital of Greece, on the site of the beautiful city of the same name which flourished in the time of Pericles and which

fell into decay in the Middle Ages. The population of the modern city is 74,580.

PISA, *pe'za*, ITALY, the capital of the province of Pisa, five miles from the Mediterranean, forty-nine miles west of Florence, on both banks of the River Arno. The city is surrounded by walls and ditches and is defended by a citadel, the fortified circuit having a length of nearly six miles, much of the space enclosed being unoccupied. The river is lined by handsome quays on both sides; the streets are spacious and well paved, and the houses are remarkable for the profusion with which marble has been employed in their construction. In the northwest part of the city is the famous Piazza del Duomo, which contains a remarkable group of buildings, consisting of the magnificent cathedral, which dates from the eleventh century; the baptistry; the Campo Santo, or cemetery, and the famous Leaning Tower (see PISA, LEANING TOWER OF).

The city is the site of a university, founded in the fifteenth century, and an academy of fine arts, founded by Napoleon. There are also many valuable art treasures. Among other interesting buildings is the house where Galileo was born. Pisa is an important center for the manufacture of cotton goods, and it has a thriving trade in oil and marble. Population in 1914, 66,432 (including suburbs).

PISA, COUNCIL OF, a general council of the Roman Catholic Church, held to consider the pretensions of the rival popes of Avignon and of Rome, opened March 25, 1409. The rival popes, Benedict XIII (of Avignon) and Gregory XII (of Rome), were summoned to appear within a stated period, but refused to comply. After mature deliberation both popes were formally deposed, and Cardinal Pietro Philargi, archbishop of Milan, was elected. The authority of the council was not, however, generally recognized, and it was not until 1417 that the schism can be said to have terminated.

PISA, LEANING TOWER OF, a celebrated leaning bell tower in the town of Pisa, Italy. It was built between 1174 and 1350, of marble, in the Romanesque style of architecture. It is 179 feet high and slants about fourteen feet from the perpendicular. There are eight stories, each of which is encircled outside with arches. An inner stair leads to the bell tower at the top, in a series of tortuous windings.

PISCES, *pis'seez* (the fishes), the twelfth sign of the zodiac, into which the sun enters about Feb. 19. The constellation contains some interesting double stars. The symbol of Pisces is).(.

PIS'CICULTURE. See FISH AND FISHERIES.

PISIS'TRATUS (612–527 B. C.), a tyrant of Athens. By putting himself forward as the patron and benefactor of the poor and by advocating civil equality and a democratic constitution, he was able to seize upon the Acropolis in 560 B. C., and thus to make himself master, or, as the Greeks termed it, tyrant, of the city. But though a tyrant in the Greek sense, his use of power was by no means tyrannical. He upheld the wise laws of Solon and extended their authority. He was banished twice from Athens, but in 540 B. C. he was reinstated. On his death he entrusted the government to his two sons, Hippias and Hipparchus. Pisistratus erected splendid public buildings at Athens, established a public library, collected and arranged the poems of Homer, and conducted affairs with such prudence and clemency that his country enjoyed during his term of office a period of extraordinary prosperity.

PISTACHIO, *pis tah'shi o*, a small tree native to Persia and Syria, which is cultivated throughout Northern Africa and Southern Europe. It produces a dry fruit somewhat like an olive, the stones of which contain a finely flavored green kernel. This kernel is much used in flavoring candies, ices and other culinary dainties. Besides this tree, the genus *pistacia* includes the *turpentine* tree, which yields a liquid resembling turpentine; the *batoum* tree, of Northern Africa, from which a gum resin is obtained, and the *pistacia oleosa*, a tree of Cochin, China, the kernels of which produce a fragrant oil, used in perfuming ointments.

PISTOL. See REVOLVER.

PITCH. See TAR.

PITCH'BLENDE, a massive ore of uranium, in which the wonderful substance radium was discovered. It was for a long time the only known source of radium supply. It was first mined in Bohemia; later, deposits were discovered in Sweden, Wales, Cornwall and Colorado. The mineral is black or brown and has a luster like pitch. See RADIUM.

PITCH'ER PLANTS, a family of plants that are so named because the margins of

their leaves grow together in such a way as to form the leaves into pitcherlike receptacles which become filled with rain water. At the mouth of the pitcher there are glands which secrete a honeylike substance that attracts insects. The mouth is also studded with stiff, sharp-pointed hairs that project downward. When the insect enters the pitcher it cannot get out, and is drowned. The nutritive portions of the insects are absorbed by the plant and form a part of its food. The *sarracenia,* found in swamps east of the Rocky Mountains, is the best known species. The flower is globular and of a dark reddish-purple with a straw-colored center.

SARRACENIA

PIT'MAN, the family name of two English brothers, who achieved distinction as inventors of the shorthand systems which bear their name.

Sir Isaac Pitman, (1813-1897), inventor of the Pitman system of phonography, was born in Trowbridge, England, and was educated at London. After the publication of his *Stenographic Soundhand,* in 1837, he devoted himself entirely to the promotion of shorthand study. He founded the *Phonetic Journal,* and edited it for over fifty years. He was an ardent advocate of spelling reform, and was instrumental in introducing postage stamps into England. In 1894 he was knighted for his service in the promotion of shorthand writing. His system is favored above others in England.

Benn Pitman, (1822-1910), British-American author of phonographic works and a wood carver, was born in Trowbridge, England. He adopted his older brother Isaac's shorthand system with notable variations, for the use of the American public. He founded the Phonographic Institute in Cincinnati, O., in 1853, and invented an electro process of relief engraving. He introduced what is known as the Pitman school of wood carving, which provides for the treatment of naturalistic designs with beautiful effects. He is author of a *Life of Sir Isaac Pitman.* See SHORTHAND.

PITT, WILLIAM, First Earl of Chatham (1708–1778), one of the most illustrious statesmen of Great Britain. He was educated at Eton and Oxford, entered Parliament in 1735 and soon attracted notice as a powerful opponent of Robert Walpole. Pitt came into his first office, that of Vice-Treasurer of Ireland, in 1746, and later in the same year, on becoming Paymaster-General, greatly increased his popularity with the people by declining the traditional perquisites of that office. In 1746 he became Secretary of State and the real head of the government. He was dismissed in 1755, on account of his opposition to the Ministry's policy, but no stable administration could be formed without him, and he returned to power the same year and became Secretary of State and leader of the House of Commons, which made him virtually head of the government. It was under this administration and entirely under the inspiration of Pitt that Great Britain rose to a place among the nations which it had not before occupied. He supported the ambitious designs of Wolfe in Canada and of Clive in India, and curbed the rival power of France in Europe by aiding Frederick the Great.

WILLIAM PITT

The accession of George III brought Lord Bute into power, and Pitt, disagreeing with Bute, resigned in 1761. In 1766 he strongly advocated conciliatory measures toward the American colonies and undertook to form an administration, in the same year entering the House of Lords as earl of Chatham. But his Ministry was not successful, and in 1768 he resigned. Pitt was one of the greatest War Ministers England ever had, and he was a friend of the people and of the American colonies. He was buried in Westminster Abbey, where a monument was erected to his memory.

PITT, WILLIAM (1759–1806), second son of the above and one of the greatest of England's Prime Ministers. He was educated at Cambridge, was admitted to the bar in 1780 and entered Parliament the following year, at the age of twenty-one. Two years later

he was Chancellor of the Exchequer and at the age of twenty-five he became Prime Minister. Devoting his attention to the economic problems of the country, he abolished many useless offices, improved the loan system and created a sinking fund to reduce the national debt.

In 1793 war arose between Great Britain and France, a conflict which brought a heavy responsibility on Pitt, as well as immense sacrifices and burdens on his country. In 1800 the Irish union was accomplished, but in the following year the opposition of the king to all concessions to the Irish Catholics caused Pitt to resign his post. When war again broke out with France, in 1803, Pitt returned to power and exerted all his energy to render the contest successful. He found means to engage the great military powers of Russia and Austria in a new coalition, which was dissolved by the Battle of Austerlitz. This event he did not long survive.

Throughout his career Pitt maintained an aloofness toward his fellows which often provoked antagonism, but his professional integrity made him secure with Parliament and with the people. His private life was so exemplary as to be everywhere a subject of comment in his day.

PIT'TI PALACE, a palace in Florence, Italy, one of the most famous buildings of its kind in the world. It was begun in 1440, after plans by Brunelleschi, for the wealthy and prominent Pitti family. The first story was built, then the work was suspended, and the two other stories were added in the sixteenth century. The palace is now one of the residences of the king of Italy. It contains one of the finest collections of paintings in the world, and the galleries are open to the public.

PITTS'BURG, KAN., in Crawford County, 130 miles south of Kansas City, on the Atchison, Topeka & Santa Fe, the Missouri Pacific, the Joplin & Pittsburg, the Frisco and the Kansas City Southern railroads. It is in a rich agricultural region, near valuable coal fields and the mineral deposits of southwestern Missouri. There are railroad shops, a foundry, machine shops, large brick and sewer pipe works, lumber and flour mills, grain elevators, packing houses, an ice factory and other establishments. The state Auxiliary Manual Training Normal School is located here, and the city has a public library, and two hospitals. The place was settled in 1876, was incorporated in the same year and was chartered as a city of the second class four years later. It became a city of the first class in 1905. Population, 1910, 14,755; in 1917, 18,340 (Federal estimate).

PITTSBURGH, PA., a notable city in the western part of the state, the center of the largest district in the world in which iron and steel manufacturing is the leading industry. Pittsburgh is second only to Philadelphia in population among cities of the state, and it ranked ninth in the United States in 1918, according to Federal estimates. In that year it was credited with 593,303 inhabitants, as compared with 533,905 in 1910. THE STEEL CITY, as it is popularly known, is situated in Allegheny County, of which it is the county seat, at the confluence of the Allegheny and Monongahela rivers. It is 354 miles west of Philadelphia, 430 miles southwest of New York and 468 miles southeast of Chicago, on the Pennsylvania, the Baltimore & Ohio, the Wabash and numerous other railroads.

General Description. The oldest portion of the city is built on a flat, triangular tongue of land between the two rivers, but this land rises rapidly toward the east, where eminences attaining a height of 400 and 500 feet are found. Several industrial sections on the south bank of the Monongahela also constitute a part of the city, together with Allegheny City, across the Allegheny River to the north, formerly a separate municipality, though always industrially and socially closely related to Pittsburgh. In the older part of the town the streets follow the directions of the rivers and consequently tend to converge; but in the eastern and residential sections the city is more regularly laid out. Here the streets are broad and well shaded, and they cross each other in most instances at right angles.

About three miles east of the industrial center is Schenley Park, in the midst of the residential section, with an area of 440 acres. Within the park are the Phipps Conservatory, the Hall of Botany, Music Pavilion and Carnegie Institute and Library. Highland

Park, situated on the Allegheny in the northeastern portion of the city, comprises over 360 acres of picturesque landscape. It is noted for its zoölogical gardens and for the large city reservoirs. There are also a number of other small parks. Schenley and Highland parks and the business district are connected by handsome boulevards.

Buildings and Institutions. Among the prominent buildings are those of the Carnegie Institute, the Allegheny courthouse, one of the finest structures of its kind in the Union; the postoffice; the Frick Building, a granite structure twenty stories high; the Union, the Arcade, the Chamber of Commerce, the Farmers' Deposit National Bank, the Carnegie, the Park, the Tradesmen's and the People's Bank buildings. Among the churches worthy of mention are the Saint Paul's Cathedral; the First and the Third Presbyterian churches; Trinity Methodist, Saint Augustine, and Calvary. Of the public institutions the Carnegie Free Library and the Carnegie Institute are the most noted. The charitable institutions include fourteen hospitals, a newsboys' home, a home for working girls, asylums for the deaf and dumb and blind and numerous other institutions, which together cover a wide range of interests. The chief educational institutions are the University of Pittsburgh, Pennsylvania College for Women, Duquesne University, several theological schools and the Carnegie Institute for technical education. The great Carnegie Library has a collection of about 425,000 volumes. There is also a Carnegie Library in the Allegheny section.

Industry. Located in the iron, coal, petroleum and natural gas regions and within favorable distance of all the leading cities of the Atlantic seaboard and the interior of the country, Pittsburgh has become one of the largest industrial centers in the United States. Here are located several subsidiary plants of the United States Steel Corporation, whose main plant is at Gary, Ind. Within the Pittsburgh district, which includes many adjoining towns and cities, are produced about one-third of the pig iron of the United States, and over one-third of the nation's supply of steel of all kinds. In Pittsburgh is the largest cork factory in the world; the city is also one of the foremost American centers for glass manufacture. At Wilmerding, a suburb, is located the great Westinghouse Air Brake plant, and at East Pittsburgh, that of the Westinghouse Electric Company. Allegheny is the seat of the main plant of the largest firm in the United States making pickles and preserves. It is this company which advertises "57 varieties." Other important enterprises are petroleum refining, slaughtering and meat packing, printing and publishing, the manufacture of stogies, an original Pittsburgh product, and the construction of optical and surgical instruments.

History. The old town was built on the site of Fort Duquesne, erected by the French in 1754. Against this fort Braddock directed his ill-fated expedition in 1755, making his brave, but foolhardy, fight against an invincible and almost invisible foe. Three years later the fort was captured by the British; a new fort was erected and named Fort Pitt, in honor of William Pitt, prime minister of England. The first permanent settlement was made in 1765. It became the county seat in 1791 and was chartered as a city in 1816. Pittsburgh long had a reputation as being one of the smokiest cities in the country, but conditions have been much improved since the establishment of a Smoke Regulation Bureau.

PITTSBURGH LANDING, Battle of. See Shiloh, Battle of.

PITTSFIELD, Mass., the county seat of Berkshire County, fifty miles northwest of Springfield, on the Boston & Albany, the New York, New Haven & Hartford and the New York Central railroads. The city has a beautiful location among the Berkshire Hills, at an elevation of over 1,000 feet, near several picturesque lakes. It is an attractive residence place and a popular summer resort. The principal structures include the Berkshire Athenaeum, containing a large public library and the rooms of the Berkshire Historical Society; the Crane Art Museum; a courthouse, built of white marble, and the buildings of the Berkshire Life Insurance Company. The city also has Saint Joseph's Academy, House of Mercy Hospital, a training school for nurses, a home for aged women and three public parks. There are cotton, woolen and silk mills, manufactories of electrical supplies, foundry and machine shops, paper mills and shoe factories. The place was settled as Boston Plantation in 1743, was incorporated under its present name in 1761 and was chartered as a city in 1891. A Federal building was erected in 1911. Population, 1910, 32,121; in 1917, 39,648 (Federal estimate).

PITTS'TON, Pa., in Luzerne County, ten miles southwest of Scranton, on the Susquehanna River and on the Lehigh Valley, the Erie, the Lackawanna, the Delaware & Hudson, the Lackawanna & Wyoming Valley and the Central of New Jersey railroads. It is in an anthracite region, and coal mining is the principal industry; more than seventy mines are in the vicinity. Fire clay is found in the vicinity, and there are foundries, machine shops, glass works, stove and engine works, brick and terra cotta plants and knitting, flour, paper and lumber mills. Pittston is chiefly a commercial and industrial city, while West Pittston, on the opposite side of the river, is more distinctly a residence place. Pittston was laid out and named in honor of William Pitt in 1770, and was chartered as a city in 1894. Population, 1910, 16,267; in 1917, 18,975 (Federal estimate).

PI'US, the name of ten Popes, the most, important of whom are the following:

Pius II (1405–1464) was one of the most eminent scholars of his day. He studied at Siena, subsequently became secretary to Cardinal Capronica and to Antipope Felix V. Having been sent on an embassy to Emperor Frederic III, he was persuaded to accept office in the imperial court and was made embassador, successively, to the courts of Milan, Naples and Rome. Calixtus III made him cardinal, and in 1458 he became Pope. He founded a military order of knights to defend the islands of the Aegean Sea against the Turks. But he was best known for his literary works, the most interesting of which are his letters.

Pius V (1504–1572) was Pope from 1566 to 1572. His chief service was to enforce the reform decrees of the Council of Trent. With Spain and France, he organized the Holy League against the Turks, which resulted in the naval battle in the Gulf of Lepanto, October 7, 1571.

Pius VI (1717–1799) held important offices under several pontiffs, and was created a cardinal by Clement XIV, whom he succeeded as Pope in 1775. To this Pope Rome is indebted for the draining of the Pontine marshes, the completion of the Church of Saint Peter and the improvement of the port of Ancona.

Pius VII (1742–1823) was at the beginning of his clerical career a Benedictine monk. He was created bishop of Tivoli by Pius VI, and after becoming cardinal was transferred to the bishopric of Imola. His friendly attitude toward the Cisalpine Republic secured him the favor of France and the election to the Papal chair in 1800.

Napoleon, desiring to restore religion to its old status in France, had himself crowned by this Pope at Paris in 1804. However, the Pope refused to recognize Joseph Bonaparte as king of Naples, and Napoleon, in 1809, seized the States of the Church. The Pope issued a bull of excommunication against the emperor and in consequence was arrested and taken to Fontainebleau.

Pius IX (1792–1878) was the last of the Popes to exercise temporal power, for in the course of his Papal office Italy became unified into a kingdom, and Rome became the seat of government. Pius was created a cardinal in 1840, and six years later, on the death of Gregory XVI, was elected Pope. When the revolution swept Rome in 1848 he fled, but two years later was able to return. He was strongly opposed to the unification of Italy, but after the withdrawal of the French and the establishment of the kingdom of Italy, he retired from active politics, delegating such affairs to his legates.

Pius X (1835–1914), the successor of Pope Leo XIII, was born near Venice, the son of humble peasants. He was sent from the village school to the college at Castel Franco, then to the central seminary at Padua, where he graduated with much distinction. He was ordained priest in the Cathedral of Castel Franco on Sept. 18, 1858, and became an assistant in the parish of Tombolo. In 1867 he was transferred to Salzano, and eight years later, was appointed canon of the cathedral of Treviso, chancellor of the diocese and spiritual director of the college. Soon he was made dean of the chapter, and after serving during an interregnum as vicar-general, he was appointed suffragan by the new bishop and afterwards bishop of Mantua. In 1893 Leo XIII made him a cardinal, and almost immediately afterward created him patriarch of Venice. In 1894 there was considerable anti-clerical agitation going on in Venice. But the new bishop was not long in making himself beloved by all in his patriarchate. He took a deep interest in social questions and threw himself heart and soul into all enterprises for the bettering of the lot of the poor, lending his aid to the institution of rural banks, coöperative societies and benevolent associations. On August 4, 1903, he was elected Pope.

Pope Pius was beloved for his sincerity, his generosity and his sympathy with the people. He lived simply, almost frugally, and his manner was characterized by a charming and genuine courtesy. He was a man of great breadth of learning, was an eloquent and convincing speaker, a musician of considerable ability and a connoisseur in art. Although not a politician, according to the ordinary meaning of that word, he possessed great tact and on numerous occasions proved his executive ability. He died on August 20, 1914, and was succeeded by Benedict XV."

PIZARRO, *pe zahr'ro*, Francisco (1471–1541), a Spanish adventurer, the conqueror of Peru. The spirit of adventure that swept like a wave over Spain after the discovery of the New World brought Pizarro, in 1509, to America. He settled on the Isthmus of Pana-

ma, and in 1519 formed a partnership with Diego de Almagro and Father Luque to explore the country to the south. After much suffering and hardship, realizing the necessity for better equipment, Pizarro returned to Spain. Empowered by Charles V to conquer the coveted territory, he returned in 1530, and the following year arrived at Peru to find the country divided by civil war. Pizarro treacherously seized the reigning Inca at a friendly banquet and, after extorting an immense ransom from his followers, put him to death. The whole empire was gradually conquered without much opposition. A quarrel between Pizarro and Almagro led to strife, and in 1537 Almagro was strangled by Hernando Pizarro, a brother of the general. This act was avenged by a son of Almagro, who murdered Pizarro in his palace at Lima. He was buried in Lima, which he had founded six years before his death. See ATAHUALPA; INCA.

PLAGUE, *playg*, a contagious fever which for centuries has caused the death of thousands in various parts of the world. It is caused by a bacillus which has been recognized and found growing in rats and other small animals. These doubtless carry the infection from house to house (see GERM THEORY OF DISEASE). The plague attacks suddenly and is sometimes fatal within a few hours, but usually runs its course in three days. As characteristic of the disease, livid spots and large carbuncles sometimes appear on the skin and give to the disease the name of *bubonic plague*. There is no specific remedy, though many treatments have been adopted. Prevention by proper sanitary measures is the greatest safeguard, and is most rigidly followed.

The first recorded visitation of the plague to Europe is that at Athens (430 B. C.), described by Thucydides; Josephus records that of Jerusalem, in A. D. 72. Among the most disastrous plagues of antiquity are those of Rome in 262, with its daily toll of 5,000 persons, and Constantinople, in 544. In the thirteenth century the plague was brought to modern Europe by the Crusaders, and from 1347 to 1350 it traversed all Europe and was then called the *black death*. In 1593 it was carried to England by an army returning from the Continent. Between 1603 and 1665, over 153,849 succumbed in London alone; the plague in Marseilles, in 1720, caused the death of over 60,000 in seven months; in 1771, it swept off nearly the entire population of Moscow.

In 1899, the plague appeared in New York City and in San Francisco, but there was no extensive spread of the disease. In the same year in the Philippine Islands a number of lives were lost. Physicians contend that the disease can be controlled if public authorities will take sufficiently active measures.

PLAIN, a broad expanse of level or slightly undulating land, with an altitude not exceeding 1,000 feet. The Great Central Plain of North America, extending from the Appalachians to the Rocky Mountains, has a variety of surface, and in its western part gradually rises to an elevation of 2,000 or more feet, forming the plateau on which the Rocky Mountains rest. The merging of the plain into the plateau is so gradual that there is no visible line of separation between them. Most of this plain in the United States is treeless, but in Canada portions of it are heavily forested. The largest plain in the world is that of Eurasia, which comprises nearly all of Russia and Siberia. This plain is on one side of the continent, while the Great Central Plain of America is in the interior.

In the course of centuries the waves and tides have formed broad plains along the sea shore, by washing up the sand and soil on the ocean's bed. Such plains are called *coastal plains;* the Atlantic coastal plain of the United States is a good example. *Alluvial plains* are often formed at the mouth of rivers, by the deposit of silt, which the stream brings down. These plains are often called *deltas* (see DELTA). The deltas of the Nile and of the Mississippi are good examples. Inland plains are usually the former beds of the ocean or of ancient lakes; an example is the valley of the Red River of the North, which is the bed of the ancient Lake Agassiz.

Since plains are usually fertile wherever rainfall and temperature adapt them to agriculture, they are always densely populated.

PLANE, a term used to define the simplest of geometrical surfaces—a surface such that if any two points in it were joined by a straight line, that line would lie wholly within the surface. If two planes intersect, the line of intersection is a straight line. A plane is determined by three points not in a straight line, by two intersecting straight lines, by a straight line and a point outside of it or by two parallel lines. A plane figure is a portion of a plane bounded by lines, either

straight or curved; in the former case the figure is rectilinear; in the later, it is curvilinear. See ARITHMETIC.

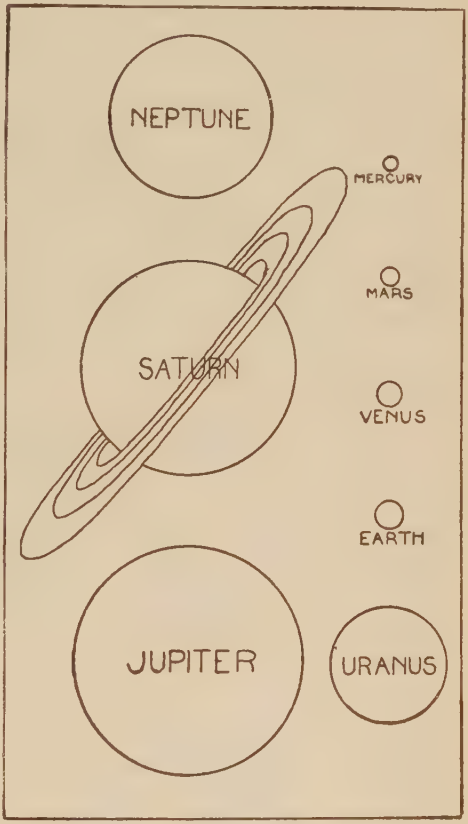
PLAN'ET. When we look at the heavens on a clear night we see a few very bright stars which shine with a steady light. These so-called stars are not stars at all, but are bodies like the earth, which revolve in their orbits around the sun and shine with reflected light. The word *planet* means *wanderer;* the name was given these celestial bodies by the ancients, because they were observed constantly to change their positions among the stars. When seen through the telescope, a planet shows a disk, while a star shows only a point of light. Before the invention of the telescope this difference could not be seen; therefore the ancients called the planets *stars,* and the name is still popularly applied to them. We speak of Venus as the "evening star" and of Jupiter as the "morning star," without thinking of them as planets.

Size and Distance from the Sun. Named in the order of their distances from the sun, beginning with the nearest, the planets are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. Between the orbits of Mars and Jupiter are hundreds of small planets known as *planetoids,* or *asteroids.*

Astronomers divide the planets into two groups; those between the earth and the sun are known as the *inferior planets,* and those outside the earth's orbit as *major planets.* The inferior planets are smaller than the earth, but, with the exception of Mars, the major planets are very much larger. Taking the earth as the standard of comparison, we find some very marked contrasts. Mercury, the smallest planet, is one-eighteenth the size of the earth, while it would take 1,200 earths to equal Jupiter, the largest. Venus is nearly the size of the earth; Mars is about one-seventh as large; Saturn is 770 times larger than the earth; Uranus is sixty-six times, and Neptune sixty times, larger than the earth.

The distance of the planets from each other increases as their distance from the sun increases. Taking the earth's mean distance from the sun as the unit of measure, the distance of Mercury from the sun is four-tenths that of the earth; that of Venus, seven-tenths; Mars, one and one-half; Jupiter, five and two-tenths; Saturn, nine and one-half; Uranus, nineteen and two-tenths; Neptune, thirty times that of the earth.

Motions. Like the earth, all planets have two motions, a revolution around the sun and rotation upon their axes. The first gives the planet its year; the second, its day. The orbits of the planets are slightly elliptical;



RELATIVE SIZE OF PLANETS

those nearest the sun are the shortest. The movement of those planets nearest the sun is also more rapid than that of those farther away. As Mercury completes its journey around the sun in eighty-eight days, or about three months, it would take four years on Mercury to equal in time one year on the earth. The year on Venus equals seven and one-half of our months. When we measure the years of the major planets, however, we find them much longer than ours. The year on Mars equals almost two of our years; Jupiter has a year equal to almost twelve of ours; Saturn has one equal to twenty-nine and one-half years; Uranus, one equal to eighty-four years, and Neptune one equal to 164.8 of our years. A centurian on Mercury would be aged only twenty-five of our years,

but a year-old baby on Neptune would have lived longer than any man on the earth since the time of Methuselah.

Another marked contrast between the inferior and major planets is that of density. Mercury, Venus and Mars have about the same density as the earth, but the larger planets are much lighter; while, for instance, it would take 1,200 earths to make a planet equal in size to Jupiter, it would take only 300 earths to make one equal to that planet in weight. A person weighing 100 pounds on the earth would weigh only thirty-eight pounds on Mars, but if transported to Jupiter he would have his weight increased to 30,000 pounds, or fifteen tons.

The following table shows the distances of the planets from the sun compared with the earth's distance, their size compared with the size of the earth, and their periods of revolution around the sun:

PLANETS	DISTANCE FROM SUN	SIZE.	PERIOD OF REVOLUTION.
Superior Planets:			
Mars	1.5	.15	687 days
Jupiter	5.2	1164.	11.9 years
Saturn	9.5	783.	29.5 years
Uranus	19.2	66.	84. years
Neptune	30.0	86.	164.8 years
Earth	1.	1.	365¼ days
Inferior Planets:			
Mercury	.4	.05	88 days
Venus	.7	.88	224.7 days

Related Articles. Consult the following titles for additional information:

Asteroids	Mercury	Saturn
Astronomy	Nebular Hypothesis	Solar System
Earth	Neptune	Star
Geology	Satellite	Uranus
Jupiter		Venus
Mars		

PLANETES'IMAL HYPOTH'ESIS. See GEOLOGY, subhead.

PLAN'ETOID, one of the many small planets revolving around the sun between the orbits of Mars and Jupiter. Over 500 have been discovered, and their number is considered to be countless, but they are so small that they cannot be seen. They are also called *asteroids*.

PLANING MACHINE, a planing tool operated by steam or by electricity. The power wood plane has as its essential parts a drum fitted with cutters which rotate on a horizontal axis. The wood to be planed is made to pass underneath. Another drum cutter may be made to operate beneath the board, and the two sides may thus be planed at one time. Machines for planing metals have stationary cutters, and the article to be planed is attached to a slab that moves forward and backward across the cutting chisel.

PLANT, the general name given to all members of the vegetable kingdom. Scientists believe that all plants have been developed in a natural way from simple cells. The algae are believed to be the oldest plants, the great parent group from which the liverworts arise directly and from which the fungi have degenerated. From the liverworts were developed the mosses, which it is thought have given rise to the ferns, and they in turn have doubtless developed flowering plants; but just what species of ferns have developed into what species of seed plants is not known positively. Many plants are highly developed and have organs especially adapted to accomplish their purposes. For instance, there are roots, to absorb water and food; stems, to support the plant and carry the sap from root to leaves; leaves, to give off oxygen and carbon dioxide and to absorb such matters as are needed in the manufacture of tissue. There are, however, plants so simple in organization that all these processes are carried on in a single cell.

Plants show as great a variety in their ways of living as in their shapes. Some live independently, while others derive their food wholly or in part from some other plant or some animal. These parasites are not confined to the lower orders of plant life, but are sometimes found as degenerate forms of the highest. Mistletoe and dodder are examples of the latter class. Many species are armed with defensive or protective organs, such as flinty bark, cutting edges, thorns or stinging hairs; others are fitted to capture, hold and digest insects. Harmless plants sometimes mimic the appearance of dangerous species or are colored so as to be almost indistinguishable from the pebbles or earth upon which they live. More surprising still is the storing of poisons or disagreeable matter in a plant, making it unpleasant for animals to eat; or, the growth of means for retaining a bodyguard of ants, which keep plants free from lice and other disturbing insects. The arrangements by which flowers secure cross-fertilization through the agency of insects are among the greatest marvels in nature.

Plants grow by seeds or by roots and rootstocks, and the methods by which the seeds

are scattered are nothing short of marvelous. Some are distributed by means of the wind, the threadlike plumes of the milkweed and dandelion being examples of organs that aid in that way. Some plants break off bodily from the ground and go tumbling over the land. Other fruits are armed with hooks or barbed prickles, by which they attach themselves to wandering animals, and still other fruits are covered by pulpy growths attractive to birds, who aid in the distribution of the hard seeds. The number of seeds produced is in many plants entirely out of proportion to the number that survive. A single orchid has been known to produce 10,000,000 seeds. Some plants have become so highly developed that they are able to adapt themselves to almost all conditions and are known to us as weeds.

Lessons on Plants. *General Suggestions.* 1. Let the lessons conform to the arrangement in your course of study, even though you think you might improve upon that arrangement.

2. Remember that children of the primary and intermediate grades are more interested in studying objects as wholes than they are in studying them by analysis. Do not attempt minute or extended analysis in these grades.

3. Lead the children to do the work under your direction. Ask them to look for that which you wish them to observe and then give them the opportunity to tell what they saw.

4. Remember that through the nature-study lessons you can easily and logically correlate the other branches of study in the course. See that these lessons contribute to the work in language, number, geography and literature.

5. Enter into the work with enthusiasm yourself and the children will become enthusiastic. Study to make your questions and descriptions brief, pointed and plain. Do not use technical terms nor language that the pupils cannot readily understand.

6. Make all preparation for the lesson before calling the class, so that the lesson will begin promptly and continue to the end without interruption.

Selection of Plants. 1. In selecting plants for study in the primary and intermediate grades, bear the following points in mind:

First, the study of plants in these grades should take place in the spring and early summer because the plants which appear and blossom early in the season are more simple than those reaching maturity later.

Second, other things being equal, plants common to the locality should be selected. It is of great advantage if enough specimens can be secured to provide every pupil in the class with a plant.

Third, select plants large enough to have their parts easily recognized. Young children should not be called upon to observe minute objects.

Fourth, whenever possible, have the pupils collect the plants themselves. With children in the first and second grades this will have to be done under the direct supervision of the teacher or an assistant. Plants should be carefully removed from the soil, so that the roots will remain intact. Before distributing the plants for the lesson, hold the roots under water until all the soil adhering to them is washed off.

Illustrative Lessons. *Parts of a Plant,* The yellow adder tongue, also known as the dog-tooth violet, is an excellent plant with which to begin this study. The trillium the hepatica, or liver leaf, the claytonia, or spring beauty, or a violet can also be used. Present the study according to the following plan:

1. Collect and prepare the plants.

2. Call the class and distribute the specimens.

3. Study the plant as a whole.

a. Name. Does anyone know the name of this plant? Possibly some of the children do know its name. If not, give the name.

b. Habitat. Under this head lead the children to tell you what they know about the place in which the plant grows. If they have helped to collect the specimens they can readily tell you in what places it is found. If they do not know where it grows tell them, and if the specimens can be found near the schoolhouse, go with them or have one of the older pupils go with them to find the specimens.

4. Study the parts of the plant. The children will be interested in the large leaves with their beautiful green and brown surfaces and in the single bell-shaped flower at the end of the stem which grows between the leaves. Let the lesson at first follow these lines of interest.

By skilful questioning learn what the pupils have seen.

How many leaves has the plant?
What is their color?

Are they colored alike on both sides?
What is the shape of the leaves?
To what are the leaves attached?
What is on the stalk which grows between the leaves?
How many flowers does each plant have?
What is the color of the flower.
What part of the plant grows under the ground?
What do we call this part?
What joins the root to the leaves?

5. Comments. Answers to these questions will lead the children to see that the parts of the plant are root, stem, leaves and flower. The questions above are arranged to follow the children's interest instead of in the logical order that would suggest itself to the mature mind of an adult. By stimulating the child's interest in those parts of the plant which most easily attract attention, the teacher can easily direct his interest to the other parts which she wishes him to observe.

With the first or second grade class the work suggested above will be enough for one lesson, and the time devoted to it should be from ten to fifteen minutes.

Parts of the Flower. With a strong second grade class and with classes in the third grade and beyond, the parts of the flower can be studied with success. The extent of the study should be kept well within the capacity of the pupils, and it is seldom wise to analyze stamens and pistils with classes below the fourth grade.

Call attention to the size of the blossoms on the different plants.

Are they all the same size?
About how long are they?
What is their shape.
What is their color?
How many leaves has each blossom?
How do these leaves differ from those on the stem of the plant?
Are all the leaves of the flower alike?
What color are they?
What do you see in the flower cup?
How many of these organs can you find?
Are they all alike?

One or more flowers from specimens in the teacher's possession should be cut open to display the parts, as illustrated in the cut. If the class is far enough advanced in the work, parts of the stamen and pistil and the pollen can be touched upon in this lesson.

Other Lessons. The foregoing are types of lessons that can be given on other plants. As the work advances the lessons should extend to the study of parts in more detail, as the form, size and structure of the leaves and the way they are joined to the stem. The stem also should be studied, special attention being called to the difference in appearance of the portion above ground and beneath the surface. Lead the pupils to notice carefully the distinction between the bulb and the roots.

In the fall term these spring plants should again be considered, and a brief study made of the seeds. The plans presented above can be used in the study of any plant or flower. If the structure is complex the study need only be extended to include the new features. However, these complex structures should be approached with care. Teachers occasionally fail in nature study work because they attempt too much, or because they present subjects that are too difficult. It is far better to do a few things well and in so doing establish in the pupils the habit of close and systematic observation than it is to dissipate their energies on so many subjects that they acquire careless habits of study.

Related Articles. Consult the following titles for additional information:

GENERAL

Agriculture — Floriculture
Botany (with list) — Gardening
Breeding — Grafting
Burbank, Luther — Horticulture
Cross Fertilization — Natural Selection

AQUATIC PLANTS

Algae — Cat-tail — Papyrus
Bladderwort — Nelumbo — Water Lily

CARNIVOROUS PLANTS

Butterwort — Sundew
Pitcher Plants — Venus's Flytrap

CREEPING PLANTS

Bindweed — Lysimachia — Virginia Creeper
Ground Ivy — Pyxie
Ivy — Smilax — Wandering Jew

DESERT PLANTS

Agave — Cereus — Sagebrush
Cactus — Mesquite — Yucca
Prickly Pears

DISEASES OF PLANTS

Blight — Ergot — Rusts
Bunt — Mildews — Smuts

DYE PLANTS

Acacia — Indigo — Saffron
Annatto — Logwood — Turmeric
Brazilwood — Madder — Woad
Safflower

FIBER PLANTS

Cotton — Hemp — Nettle
Flax — Hibiscus — Sisal

FLOWERS

See Flowers

FORAGE PLANTS

Alfalfa — Clover — Tare
Blue Grass — Gama Grass — Timothy
Buffalo Grass — Millet — Vetch

FRUITS

See Fruits

FUNGOID PLANTS

Agaric — Mushrooms — Truffle
Fungi — Puffball — Yeast
Molds — Slime Molds

GRAINS

See Grains

GRASSES

See Grasses

HERBS

See Herbs

MEDICINAL PLANTS

See Medicine

MOSSES AND LICHENS

Iceland Moss
Irish Moss
Lichens
Liverworts
Mosses

NUTS

See Nut

PARTS OF PLANTS

Bark
Bud
Bulb
Leaves
Pollen
Roots
Stems

PLANT PRODUCTS

Amber
Attar
Balm of Gilead
Balsam
Coffee
Copal
Cork
Cotton
Lumber
Resins
Rosin
Sago
Cacao
Calabash
Canada Balsam
Caper
Cardamom
Chocolate
Galls
Ginseng
Gum
Gum Arabic
Gum Resins
Lac
Starch
Straw
Tar
Tea
Tragacanth
Turpentine

SPICES

See Spice

TREES

See Tree

WEEDS

See Weeds

VEGETABLES

See Vegetables

PLANTAGENET, *plan taj'e net,* a royal house of England, which ruled from 1154 to 1399. The name is said to have been first applied to Geoffrey of Anjou, from his habit of wearing a branch of broom (*planta genesta*) in his cap. The name was borne by fourteen kings, from Henry II, son of Geoffrey, to Richard III. In 1400 the family was divided into the branches of Lancaster and York, and from their union in 1485 sprang the House of Tudor.

PLAN'TAIN, the name of a family which includes several species of well-known weeds. The *common,* or *greater, plantain,* has a rosette of light green leaves, from the center of which long, cylindrical spikes, bearing greenish, inconspicuous flowers, are sent up. This perennial weed is often a pest in lawns and gardens, chocking the growth of all crops. Another species, known as *bracted plantain,* or *rib grass,* is very abundant through the Middle and Western states. It ripens innumerable seeds, and as these are frequently mixed with grass and clover seeds, the plant is widely distributed.

GREATER PLANTAIN

The name *plantain* is given to a tree native to the East Indies and cultivated in almost all tropical countries for its fruits, which resemble those of the banana. These fruits are not so sweet nor so palatable as bananas, but when cooked they are a good dish and constitute the chief article of food in many tropical regions.

PLANT LICE. See APHIDES.

PLAS'TERING, the art of covering surfaces of masonry or woodwork with mortar, cement, staff or stucco, to impart to it a smooth, uniform surface. The wall is generally first covered with laths, or thin strips of wood, having narrow spaces between them. The face of the first coat, which should be of considerable thickness, is troweled, or indented, with cross lines to form a key for the finishing coats. The second coat is applied when the first has thoroughly dried. It is rubbed in with a flat board, so as to fill the indentations thoroughly and to cover the unequal surface of the first coat with a smooth and even one. In plastering walls, great care must be taken to have the surface perfectly vertical. The setting coat, which is of pure lime, or for moldings or finer work, of plaster of Paris or stucco, is applied to the second coat before it is quite dry. A thin coating of plaster of Paris is frequently applied to ceilings after the setting coat. See CEMENTS.

PLASTER OF PARIS, a cement made of gypsum. The gypsum is ground to powder and baked at a high temperature to expel the water. If this dry powder is mixed with double its quantity of water a paste is formed which hardens in about eight minutes. When lime is added to the mixture, a much harder substance is produced. Plaster of Paris is much used in surgery for making casts, and in the arts in making copies of sculpture. It has been widely employed for wall stucco, both for interior and exterior work. It has a certain utility as a fastening for fixtures where nails and bolts cannot be used.

PLATA, RIO DE LA. See RIO DE LA PLATA.

PLATAEA, *plah te'a,* an ancient city of Greece, in Boeotia. Because the Plataeans aided the Athenians at the Battle of Mara-

thon, Xerxes destroyed their town in 480 B. C. It was rebuilt, however, and during the Peloponnesian War it remained such a firm ally of Athens that it was taken by the Spartans. In 373 B. C. it was again destroyed by the Thebans. During the time of Alexander the Great it was rebuilt, but it was never again of much importance.

PLATEAU, *pla to'*, an elevated tract of land with a nearly level surface, formed in a mountainous region by the gradual uplifting of great sections of horizontal strata. The distinction between plateau and plain is one of altitude, the latter rarely being more than a thousand feet above sea level. Plateaus are hundreds and even thousands of square miles in extent, and because of their altitude their streams cut deeper valleys than do those of the plains, often forming deep gorges (see GRAND CANYON OF THE COLORADO).

The most noted plateaus of the world are the Rocky Mountain plateau, in the United States; the Andean plateau, in South America, and the plateaus of Tibet and Pamir, in Asia. The latter are the highest and most extensive in the world.

In arid regions, canyons cut the plateaus into tablelands. The high plateaus between mountains are usually rude and barren. Some, because of their altitude, have a climate too cold for successful agriculture. This is true of the plateaus of Tibet and Pamir. Others are robbed of moisture by the surrounding mountains, but occasionally streams flow down the sides of these mountains and form fertile deposits known as alluvial fans. Wherever these occur, they have an appearance similar to that of an oasis in a desert.

Related Articles. Consult the following titles for additional information:

Butte	Mountain	Plain
Mesa	Pamir	Tibet

PLATING, *playt'ing*, the coating of a base metal with one of the finer metals, especially with gold or silver. Formerly plating was done by soldering upon an ingot of base metal a thin plate of precious metal, usually silver, rolling the metal into sheets and working it into the desired shape. To-day, nearly all plating is done with the aid of electricity. See ELECTROPLATING.

PLAT'INUM, one of the chemical elements, the most valuable metal known. In the latter part of the nineteenth century its money value increased steadily as the demand grew faster than the supply, and after America entered the World War its price was fixed at $105 an ounce. Native platinum occurs mostly in small, irregular grains, usually containing a little iron, and it is accompanied, besides, by iridium, osmium, rhodium, palladium and ruthenium (hence called the "platinum metals") and sometimes by copper, chromium and titanium. It was first obtained in Peru and has since been found in various other localities, including Canada, Oregon, the West Indies, Brazil, Colombia, Borneo and Asia. About eighty-five per cent of the world's supply of platinum ore hitherto has come from the Ural Mountains in Siberia. It was there discovered in beds of gold-bearing sands in 1823, and mining by the Russian government began in 1828. The gold-bearing deposits of California, Oregon and Nevada produce a small quantity, about 600 ounces a year.

Pure platinum is almost as white as silver, takes a brilliant polish and is highly ductile and malleable. It is the heaviest of the ordinary metals and the least expansive when heated. It undergoes no change from the combined agency of air and moisture, and it may be exposed to the strongest heat of a smith's forge, without suffering either oxidation or fusion. Platinum is not attacked by any of the pure acids. Its only solvents are chlorine and nitro-muriatic acid, which act upon it with greater difficulty than on gold. In a finely divided state, it has the power of absorbing and condensing large quantities of gases. On account of its power of withstanding heat and the action of chemical reagents, platinum is much used as a material for making such vessels as crucibles and evaporating dishes, to be used in the chemical laboratory. The useful alloys of platinum are not numerous. With silver, it forms a tolerably fusible white alloy, malleable and brilliant when polished; but it scales and blackens when worked. Gold combines with platinum, and the alloys, in all proportions, are more fusible than the latter metal. Alloyed with iridium (a rare metal of the same group), and platinum possesses an excellent and unalterable surface for fine engraving. This alloy has also been adopted for the construction of international standards of length and weight. A coating of platinum can be given to copper and other metals by the application of an amalgam of spongy platinum and mercury, the latter be-

ing then driven off by heat. Steel unites with platinum in all proportions, and in the proportion of from one to three per cent of platinum, it forms a tough and tenacious alloy, well adapted for cutting instruments.

PLA'TO, (427–347), a celebrated Athenian philosopher, who has been called the "finest of human intellects," was born of noble family. He descended on his father's side from Codrus, the last king of Athens, and through his mother was connected with the legislator Solon. Aristocles was the name given him, but he was called Plato, either because of his broad shoulders or broad brow. Throughout his early manhood he was a pupil and devoted friend of Socrates; after Socrates' death he traveled abroad ten years, visiting Egypt, Northern Africa and Sicily. At the age of forty he returned to Athens and established a school of philosophy known as the Academy. Here he taught forty years, using the Socratic method of asking questions to provoke discussion and argument. The discussions were the basis of most of his writings, which are all in the form of dialogue.

Believing that the corruption of the world arises from ignorance, Plato based his whole philosophy on two dominant motives—a passion for knowledge, and consequent human improvement, and a persistent belief in the supremacy of mind. Knowledge was not to be sought as an end in itself, nor for self-aggrandizement, but as a guide of life. "Nature and life should be studied as an orderly, connected whole." "Only that is accounted of value which elevates the soul and serves to strengthen, purify and ennoble life." Plato's theory of knowledge embraced the idea that reality does not reside in the transitory individual thing, but in the concept: that is, the general idea of horse, house, dog, which exists in men's minds, is imperishable, while the individual horse, house, dog, which is but a copy of the universal, soon passes away.

In this position Plato is the forerunner of idealism, for he was the first to advance the belief that the world of our ideas is nearer the ultimate reality than the world of sense perception. Through his promulgation of this doctrine, which has many ramifications, he exerted his greatest influence on the thought of the world. According to it the soul becomes our essential being; the body a thing only vaguely known and withal transitory. This belief leads logically to faith in immortality. Plato believed in one eternal God, and in a previous, as well as a future, existence.

In most of the dialogues of Plato—*Laches, Charmides, Lysis, Protagoras, Io, Meno,* the *Symposium, Phaedrus*—Socrates is the chief speaker. *Euthyphro, Apologia, Crito* and *Phaedo* treat of the trial and death of Socrates. In his most ambitious work, the *Republic,* Plato outlined what he believed to be the organization of the ideal state. His state is made up of three hereditary classes—the industrial, who provide the material means of living; the military, who guard the lives of citizens; the rulers, especially trained to direct and teach. Only those brought up and trained to the duties of government are capable of exercising its power.

PLATT, THOMAS COLLIER (1833–1910), an American politician, born at Owego, N. Y. He attended Yale College three years and later became president of Tioga National Bank, a member of the lower house of Congress (1872–1876) and United States Senator (1881). He resigned the last position on account of a disagreement with President Garfield as to Federal patronage, and he failed of reëlection. In 1880 he became president of the United States Express Company, and he was again elected United States Senator from New York in 1897 and in 1903.

PLATTDEUTSCH, *plaht'doich,* or **LOW GERMAN**, the language of the North German Lowlands, which extend from the borders of Holland to those of Poland. It differs from High German, the language of the most cultivated classes and of diplomacy, chiefly in its consonantal sounds and its use of *ik* (the pronoun *I* in English), in place of the High German *ich.* It is more closely related to Dutch and English than is High German. Before the Reformation Low German was the representative language of the German people, but after Luther's translation of the Bible into High German, the latter became the dominant tongue, and to-day it is the language of the government, of the schools, of literature and of all higher learning. See PHILOLOGY.

PLATTE, *plat,* the principal river in Nebraska and one of the largest tributaries of the Missouri, formed by the union of two branches—the North and the South Platte, each having its source in the mountains of

Northern Colorado. These branches unite in Lincoln County, and the Platte River flows in a general easterly direction into the Missouri. Because of its shallowness, the Platte is of no importance for navigation.

The North Platte is about 650 miles long, and its drainage basin includes about 20,000 square miles in Wyoming and 7,000 in Nebraska. The South Platte has a drainage basin of 24,000 square miles, included in which are some of the best irrigated areas in Colorado and Nebraska.

PLATTSBURGH, N. Y., the county seat of Clinton County, 167 miles north of Albany, on Lake Champlain, at the mouth of the Saranac River, and on two lines of the Delaware & Hudson railroad. It was settled in 1784 and was incorporated the next year. The village has a picturesque location on Cumberland Bay, which affords a good harbor. In the vicinity are many popular summer resorts. A state normal school is located here, and the municipality has a public library and four other libraries, and two hospitals. Other important structures are a Federal building, a courthouse and jail, homes for friendless and for aged women, a Y. M. C. A., and a new city hall. About a mile to the south is a large national military post, known as Plattsburg Barracks. The Catholic Summer School of America convenes at Cliff Haven, two miles south of the village. Plattsburg has a valuable lumber trade and contains lumber mills, sewing machine and typewriter factories, foundries, machine shops, flour, woolen and pulp mills.

The first "preparedness" military training camp for civilians was located here in 1915, and the innovation became known as the "Plattsburg idea." Population, 1910, 11,138; in 1917, 13,111 (Federal estimate).

PLAUTUS, *plaw'tus,* Titus Maccius (about 254–184 B. C.), greatest of ancient Roman dramatists and comic poets. The known facts of his life are few. He is said to have been connected with a dramatic company at Rome and then to have unsuccessfully engaged in business. Becoming destitute, he was compelled to earn his livelihood by turning a baker's handmill. While he was thus engaged he wrote three comedies, which were produced at public festivals and which brought him immediate fame. The purity of his language, his genuine humor and his faithful portrayal of middle-and lower-class Roman life made him a great favorite with the Roman public, and his plays successfully held the stage. He borrowed freely from Greek comedy, but his plays were none the less Roman for that, and admirably delineated Roman life. Twenty of his plays have been preserved, among them *Miles Gloriosus,* in which the cowardice of a would-be hero is amusingly exposed; *Aulularia; Bacchides; Casina; Cistellaria; and Amphitruo,* the last —in which the likeness of twin brothers leads to ludicrous mistakes—the source of Shakespeare's *Comedy of Errors.*

PLAY. See Games and Plays.

PLEBEIANS, *ple be'anz,* in ancient Rome the lower class, as distinguished from the patricians. They were probably the survivors of an early conquered people who had once had possession of Roman territory, and their ranks may have been added to by captives the Romans brought back from conquered towns. In the early days the plebeians were excluded from nearly every right of citizenship, the entire control of the state being in the hands of the patricians. The civil history of Rome is largely a record of the attempts of the plebeians to establish for themselves a status to which their numbers and economic importance entitled them, and their struggles were crowned with success in the third century B. C. See Rome, History of.

PLEIADES, *ple'a deez,* the so-called "seven stars" in the neck of the constellation Taurus, of which only six are visible without a telescope. They are the central group of the Milky Way. The names of the stars are Electra, Maia, Taygeta, Alcyone, Merope, Celaeno and Sterope, the last the least distinct. Atlas and Pleione are close to the group and the telescope discloses numerous other stars near them.

PLEURA, *plu'rah,* the sac of serous membrane which invests the lungs, separates their lobes from each other, and lines the walls of the chest. The membrane forms a double sac, the inner being called the *pulmonary pleura,* and the outer, the *parietal pleura.* In a healthful condition these sacs move upon each other without friction, because of a lubricating fluid that they secrete. A diseased condition of the pleura gives rise to *pleurisy.* See Pleurisy.

PLEURISY, *plu're sy,* a disease arising from the inflammation of the pleura, or the membrane that lines the middle of the chest and covers the lungs. The first symptoms

are usually chills, fever, a sharp pain in the side or chest, and a dry cough. The pain gradually increases until the slightest movement, especially breathing, causes the greatest suffering. In most cases a peculiar liquid passes into the pleural cavity, causing the growth of bacteria, which sometimes set up violent and even fatal complications. Usually, however, the amount of the fluid is so small that it is quickly absorbed. Relief immediately follows, and complete recovery takes place within a few days. The treatment usually consists of rest in bed, hot baths, the application of mustard plasters and strapping the chest to limit the breathing movements. In case of a large accumulation of fluid in the pleural sac the operation of tapping may become necessary.

PLINY THE ELDER (23–79), a Roman writer, whose real name was Gaius Plinius Secundus. He was born in Northern Italy of a wealthy family, and in his youth he went to Rome, where he was educated. Various government assignments took him from place to place, and on his travels he collected a vast fund of information which he preserved as notes. These he afterward used in writing numerous books, only one of which has survived—a *Natural History*—in which are discussions of natural history and science as then conceived. He perished in the eruption of Mount Vesuvius, in 79, and his death is described in two letters of Pliny the Younger, his nephew and adopted son.

PLINY THE YOUNGER (A. D. 62– ?), a nephew of Pliny the Elder, whose full name was Gaius Plinius Cecilius Secundus. Having lost his father at an early age, he was adopted by his uncle (see above), and he inherited the latter's estates and manuscripts. Talented, well educated and industrious, he was a personality of distinction at the age of twenty. He filled several public offices, and was consul in A. D. 100. In 103 he was appointed propraetor, or governor, of Pontica, and this office he administered satisfactorily for nearly two years. He was regarded by his contemporaries as one of the foremost men of his day. The time of his death is unknown, but it is supposed that he died about the year 115. As an author he attempted both prose and poetry, but of his writings only a collection of letters, in ten books, and a panegyric on Trajan remain.

PLIOCENE, *pli'o seen,* **PERIOD**, the name of that division of geologic time between the Miocene and Glacial periods. The formations of the Pliocene Period are of great importance in Europe, but they are found only in small areas in the United States, the most important one being near San Francisco. The life of this epoch was similar to that of the present time. Such animals as the llama, the camel, the horse, the mastodon, the rhinoceros and the tiger inhabited North America, and the animals of Europe resembled some of the species now found in Africa. See Geology.

PLOVER, *pluv'ur,* a large family of shore birds found in every part of the globe. They are round-bodied and plump, and are considered good game birds. The bill is like a pigeon's, the wings rather long and pointed, the legs moderately long and bare, the toes three in number. The birds are most frequently seen along the sea coasts at low tide, on the muddy banks of rivers and in marshy tracts about ponds, where their food, consisting of worms and aquatic insects, is abundant. Many are migratory.

The American *golden plover* breeds in the far north and in winter migrates to Central and South America, sometimes going as far south as Patagonia. Other American species are the *ringed plover* of the Arctic regions and about six related species found farther south. These include the *killdeer,* the largest; the *piping plover,* a musical bird of the Atlantic coast, and the *snowy plover,* belonging to the southwestern part of the United States. These birds lay their eggs, three or four in number and ranging in color from cream to olive drab splotched with brown, in shallow depressions in the ground, and the mother bird shows much cleverness in protecting the young. See Killdeer; Lapwing.

PLOW. Planting the seed and harvesting the crop are the most important tasks of the husbandman, and most agricultural implements have been invented or improved to lighten the farmer's labors, in planting, tilling and harvesting. One of the most valuable of these implements is the plow, for breaking up the soil and turning it over. Man's first plow was a stick with which he dug up the ground. Later he tamed the ox and the ass and trained them to haul a forked stick to tear up the soil, and from this crude implement the modern plow has been evolved through centuries of study and invention.

The important parts of the modern plow are the moldboard, for turning over the soil;

the beam, to which the other parts are attached and by which the plow is held; the stilts, or handles; the knife, or colter, which cuts the turf and roots; the share, which tears up the soil, and the landslide, which runs next to the land not cut by the furrow. Formerly the beam and handles were made of wood, but now all parts of the plow except the handles are made of iron and steel. A small truck is often attached to the forward end of the beam, for the purpose of regulating the depth of the furrow. Plows are manufactured in a great variety of styles, to suit the different purposes for which they are intended. Plows for breaking greensward are larger and stronger than those for plowing tilled land.

Sulky, or *wheel,* plows rest upon two wheels, to which is attached a seat for the driver. The wheel running in the furrow is usually larger than the other. These plows have two or more shares attached to the frame, thus forming a *gang.* They are extensively used in plowing land upon large farms on the prairies.

The largest gang plows turn fifty-four furrows and require three tractors to haul them. One of these gangs will plow an acre in about four minutes. Gang plows are hauled by gasoline or oil tractors.

PLUM, a stone fruit ranking third among orchard fruits in the United States. They are grown in every state of the Union, their annual yield (including prunes) being estimated as 15,480,000 bushels. The varieties are very numerous, differing in size, form, color and taste. Some are eaten fresh, some are dried and sold as prunes (see PRUNE), while others are preserved in sugar, alcohol, syrup or vinegar. Plums also make excellent jams and jellies, and the syrup from stewed plums forms a refreshing drink for invalids. Among the most popular varieties are *green gage,* the *Lombard,* the *Burbank,* and the *damson.* As plum trees are prolific bearers, the fruit is thinned several times a season and prepared for shipping as soon as a good color is attained.

PLUMBA'GO. See GRAPHITE.

PLUMBING, the system of pipes, basins, tanks, faucets and other fixtures by which a building is supplied with water, gas, steam heat and drainage. The name is also applied to the art of placing these pipe systems and fixtures in buildings. The name is derived from the Latin word *plumbum,* meaning *lead,* because originally nearly all pipes for carrying water were made of lead. Now, iron, steel and, in expensive dwellings or public buildings, brass, copper or nickle-plated pipes are used. Water supply and drainage, since they are most closely related to health, require the most careful attention.

Water Supply. In cities and large villages the water supply is usually owned or controlled by the municipality, which lays the main pipes and from these lays service pipes to the boundary of each lot. The householder installs the plumbing in his dwelling and connects his service pipe with that laid by the city. All but the cheapest houses have a double system of water pipes, one for cold and the other for hot water. Joints must be tight, and the pipes so placed that they are accessible when repairs are necessary. Iron pipe is generally used.

Sewerage. The health of the inmates depends largely upon the proper drainage of a building. Drain pipes connect with a sewer, and whenever there is a sewer there will be sewer gas. Since this is poisonous, air from sewers and drain pipes must be prevented from getting into the house. The *trap,* usually consisting of a *U*- or *S*-shaped tube, is the most common device for this purpose. Water always stands in the bend of the pipe and seals it against air from the drain. The waste pipe from all sinks, wash bowls, laundry tubs, bath tubs and water closets are provided with traps. Ventilation of the drainage pipes is secured by *soil pipes* which extend from the pipe in the ground through the roof.

Supervision. Plumbing is so closely related to health that nearly all cities require plumbers to take examinations and secure licenses before they can ply their trade. All plumbing must be put in in accordance with city requirements, and city inspectors see that these requirements are met.

PLUM'MET, or **PLUMB LINE,** a weight cord suspended in an excavation or in a body of water to ascertain the depth. It is also used by builders as a guide to the perpendicular. In building a high wall masons find a plummet a constant necessity. When used near high mountains the plumb line is attracted toward the mountain mass and slightly deflected from the perpendicular.

PLUSH, a textile fabric resembling velvet, but having a longer and less dense nap. It is made almost exclusively of silk, some-

times with a cotton backing. It is used to some extent for upholstery but chiefly as material for women's hats and dresses.

PLUTARCH, *plu'tahrk* (about 46–about 125), a Greek biographer and essayist, born at Chaeronea, in Boeotia. He traveled in the Mediterranean countries and had access to many libraries and records. His fame rests upon his *Parallel Lives of Illustrious Greeks and Romans,* better known as *Plutarch's Lives.* The "lives" are nearly all written in pairs, one Greek and one Roman, which bear comparison one with the other, and they are models of biographical portraiture. We have numerous editions and translations of them. Plutarch's other works, about sixty in number, generally referred to as *Moralia,* embrace essays on philosophical and ethical subjects. His writings show that he was well acquainted with the literature of his time and with history.

PLU'TO, in classical mythology, the god of the lower world, the ruler of the dead. He was the son of Saturn and Rhea, and the brother of Jupiter and Neptune. The three brothers deposed Saturn and divided the universe among them, Jupiter becoming ruler of the heavens, Neptune of the sea and Pluto lord over Hades. He was hated and feared by men. With his wife, Proserpina, he inhabited the underground regions; and because out of the ground grew the harvest he became in time honored as the god of agriculture. Since minerals, too, belonged to his domain, he was the god of wealth. As identified with wealth, however, he was called Plutus. He carried a scepter and was accompanied by his dog Cerberus, who guarded the lower regions that none might escape.

PLUTO AND CERBERUS

PLU'TUS, in Greek mythology, the god of riches. Zeus blinded him because he gave wealth to men regardless of their worthiness. By one sculptor he was represented as an infant in the arms of the goddess Fortuna; by another, he is shown as a boy with a cornucopia.

PLYMOUTH, *plim'uth,* ENGLAND, a seaport, municipal and Parliamentary borough in Devonshire, at the head of Plymouth Sound, between the estuaries of the Plyn and the Tamar. It is well defended, both seaward and landward, by a series of strong forts. The most notable buildings of the city are Saint Andrew's Church; Charles Church, built in honor of Charles I; the guildhall and the municipal buildings. There are numerous charitable and educational institutions. The two harbors of Plymouth give access to the largest vessels, and the city has a large export and coastwise trade. Tin, lead, copper and granite are exported in large quantities. Shipbuilding and fisheries are the most important industries. The chief importance of Plymouth lies, however, in its position as a naval station. It was from Plymouth that Drake set out on his expedition to sail around the world, and the *Mayflower,* on starting for America, touched at Plymouth, from which she finally set sail in September, 1620. Population of Plymouth proper, 1911, 112,030; of the Three Towns, as Plymouth, Stonehouse and Devonport together are known, 207,446.

PLYMOUTH COMPANY, in American history, a colonization and trading company chartered by James I of England in 1606, for the purpose of planting colonies in America. The London Company (which see) was organized at the same time and for a similar purpose. The Plymouth Company included merchants of Plymouth and Bristol. Their charter allowed them to plant colonies in North America between the Rappahannock River and the eastern point of Maine, but the limits of the territory are not definitely known. An attempt was made to plant a colony on the coast of Maine, in 1607, but the settlement was abandoned the following year. The company had no achievements to its credit, and in 1620 it was superseded by the Council of New England.

PLYMOUTH, MASS., the county seat of Plymouth County, thirty-five miles southeast of Boston, on Plymouth harbor, a part of Massachusetts Bay, and on the New York, New Haven & Hartford railroad. It was here that the Pilgrims settled in 1620 (see PILGRIMS). Some of the special features of interest are Plymouth Rock, on which tradition says they first landed; Pilgrim Hall, where books, pictures and other relics of early days are kept; Cole's Hill and Burial Hill, which contain the graves of many settlers,

and the large national monument to the Pilgrims, composed of a statue of Faith, surrounded by figures of Morality, Law, Education and Freedom. The town contains Morton Park, a public library and a hospital. The harbor is large, but shallow, and there is some coasting trade. A number of vessels are employed in the fisheries. The town contains manufactures of cordage, woolen and knit goods, nails, tacks, stoves and electrical supplies. The beautiful and historic situation attracts many tourists. Population, 1910, 12,141; in 1917, 14,001 (Federal estimate).

PLYMOUTH, PA., in Luzerne County, four miles west of Wilkesbarre, on the Susquehanna River and on the Delaware, Lackawanna & Western Railroad. The mining of anthracite coal is the principal industry, having existed since 1807, and there are also manufactures of mining tools, hosiery, silk and lumber products. The place was settled by the Susquehanna Company in 1768. Population, 1910, 16,996; in 1917, 19,439 (Federal estimate).

PLYMOUTH COLONY, a settlement made at the present site of Plymouth, Mass., in 1620, by a party of English Separatists, who twelve years previously had fled to Holland from England because of religious persecution. Two hundred sailed in the Mayflower and the *Speedwell* from Holland. The *Speedwell* was obliged to return, but after a stormy voyage of nine weeks the *Mayflower* passengers disembarked on Plymouth Rock, December 21, 1620. The colonists suffered terribly from starvation, exposure and disease during the following winter and lost some of their foremost men, including John Carver, the first governor. He was succeeded by William Bradford, who for more than thirty years was the leader in the colony. For later history, see MASSACHUSETTS.

PLYMOUTH ROCK, the rock in the harbor at Plymouth, Mass., on which the Pilgrims are said to have first stepped when disembarking from the *Mayflower* in 1620. In 1774, when the rock was raised for perpetuation, it split in twain, an incident which was regarded as significant of the separation of the colonies from England. On July 4, 1834, part of the rock was removed to Pilgrim Hall; the other half, protected by a granite canopy and enclosed by an ornamental iron railing, is the pride of Plymouth. See PLYMOUTH COLONY.

PNEUMATICS, that branch of physics which treats of the properties of gases at rest and in motion, including a study of the atmosphere. It treats of the weight, density, pressure, equilibrium and elasticity of air, and of its resistance and motion. It also considers air as the medium for conveying sound, heat and light, and treats of the principles and construction of those machines which depend chiefly for their action upon the pressure and elasticity of the air.

Related Articles. Consult the following titles for additional information:

Air	Pneumatic Tools
Air Pump	Pneumatic Tires
Pump	Pneumatic Tubes

PNEUMATIC, *nu mat'ik*, **TIRES**, tires consisting of rubber tubes filled with compressed air. Pneumatic tires are used on bicycles, automobiles and motorcycles, and the growth of the automobile industry has made the manufacture of pneumatic tires an industry of immense importance.

Manufacture. A pneumatic tire consists of two parts, the inner tube and the outer tube. The rubber comes to the factory prepared for making the tires. (For its preparation, see RUBBER AND RUBBER MANUFACTURE.) The sheets for the inner tube are cut into strips of the right size to make the tube. The long edges of the strips are beveled so they will form a smooth seam. The strip is then drawn over a mandrel and the edges are fitted together, and held in place by winding the mandrel with strips of wet cloth upon which strips of wet duck are

PLYMOUTH ROCK

wound spirally. The tube is then heated until the edges are cemented together. When cool, the tube is removed from the mandrel by being turned inside out, the tube for

filling the tire with air is put in place, the ends cemented together, and the tube is ready for use.

The outer tube or the case is the part of the tire that sustains the weight of the vehicle. This is the most important part of the tire, and the best material should enter into its construction. A strong cotton cloth is preferred for the fabric, into which the rubber is pressed. This is done by pressing the cloth and a sheet of rubber between steel rollers, which press the sheets together. The rubber cloth thus formed is cut into strips, which are allowed to cure. All the best outer tubes are made by hand, although machinery may be used. Successive layers of cloth are stretched over the case of the tire and rolled down by hand; then a thin layer of rubber compound is added, and the whole is enclosed in the outer layer or tread. The completed tires are sent to the press room, where they are put into molds and heated under pressure, a process known as *vulcanizing*.

Automobile tires are warranted to run from 3,500 to 5,000 miles, according to their quality. So-called cord tires, reinforced and hand made, are usually guaranteed for 10,000 miles. They should withstand an air pressure equal to twenty times their diameter per square inch. That is, a tire three inches in diameter should stand a pressure of sixty pounds, per square inch, and one four inches in diameter a pressure of eighty pounds. Akron, Ohio, is the largest center in the world for the manufacture of pneumatic tires, and it is estimated that the American automobile industry uses about 20,000,000 a year.

PNEUMATIC TOOLS, tools operated by compressed air. Most pneumatic tools are hand tools, and the mechanism for operating them is placed in the handle. They are divided into two classes—those which work as hammers and those which have a rotary motion. To the first class belong the hammer proper, chipping tools, rock drills, riveting machines and caulking machines. The rotary tools include various kinds of boring machines for metal and wood. The tools of the first class are used in metal working and in carving wood and stone. The air is conveyed to the handle by a flexible hose and usually has a pressure of from 80 to 125 pounds to the square inch. The speed and force with which the tool operates are controlled by means of a valve in the handle. In the hands of a skillful operator a riveting hammer is capable of delivering 20,000 blows a minute.

PNEUMATIC TUBES, or **PNEUMATIC DISPATCH**, a system of sending mail, merchandise and other material through tubes, either above or underground, by means of compressed air. The apparatus consists of a tube or a series of tubes, air-tight cylindrical carrying cases and an air compressor. The cases are forced through the tube by increasing the pressure of the air back of them, or by exhausting the air in front of them, forming a partial vacuum. Pneumatic tubes have been in general use in European countries for carrying mails, telegrams and other small packages for years, but they have not been so generally employed in America until recently. Now pneumatic dispatch systems are installed between main postoffices and suburban stations or railway stations, and in connection with the telegraph service, in all large cities. Many large retail stores employ the system for carrying cash from the counter to the cashier.

PNEUMONIA, *nu mo'ne a*, an infectious disease of the lungs. Pneumonia is apt to attack people who are in a weakened physical condition. It begins with chills and headache, followed quickly by fever, which lasts usually to the tenth or eleventh day, when a distinct crisis occurs, after which, if it is safely passed, the patient recovers. Death comes from heart failure, due to the poisonous products of the bacteria or from suffocation. It is not possible to cut short the duration of the attack by medical treatment, but much may be done to keep up the patient's strength, to stimulate and support the action of the heart and to reduce the temperature in the fever. In the final stage, too, assistance may be rendered in bringing up the waste matter which is cast off by the lungs. Unlike many of the bacterial diseases, one attack of pneumonia does not render a person immune from another, but it seems rather to leave a tendency to a recurrence of the disease. Physicians have long sought an effective serum to prevent or cure pneumonia, but without success.

PO, the largest river of Italy. It rises in Monte Viso, in the Alps, flows eastward 420 miles and into the Adriatic Sea, spreading out at its mouth into a wide delta. It divides the great plain of Lombardy into

two nearly equal parts and receives the waters of the stream flowing south from the Alps and north from a part of the Apennine range, among them the Ticino, the Adda, the Oglio, the Mincio, the Trebbia and the Penaro. The chief cities on its banks are Cremona, Piacenza and Turin. The Po, in spite of embankments, often overflows with disastrous results. The quantities of silt brought down by the river are constantly raising its channel, and the consequent elevating of the embankments has raised them in places to the level of the housetops. The river is navigable in its lower course and is of considerable commercial importance.

POCAHON'TAS (1595–1617), daughter of the Indian chief Powhatan, of Virginia. Accompanying her father in his dealings with the English settlers at Jamestown, she became acquainted with Captain John Smith; when the latter was captured by the Indians she saved him by throwing herself between him and the executioner. Two years later she is said to have frustrated a plot to destroy Smith and his party. After Smith had left the colony she was kept as a hostage by an English expeditionary force, and during this detention she was baptized and married to John Rolfe, an Englishman, who, in 1616, took her on a visit to England. She left one son, who was educated in London and who afterwards settled in Virginia.

POCATELLO, *po ka tel'o*, IDAHO, the second city in size in the state (Boise being larger), and the county seat of Bannock County, is 170 miles north of Salt Lake City, Utah, on the Port Neuf River and on two divisions of the Oregon Short Line Railroad. Large railroad shops are here, also a packing house, and the city is a distributing point for a large agricultural region made productive by irrigation. There are two hospitals, a Carnegie Library, Idaho Technical College, a Y. M. C. A. and a Federal building. Population, 1910, 9,110; in 1917, 12,806 (Federal estimate).

POE, EDGAR ALLAN (1809–1849), an American poet and story writer, born at Boston. On the death of his mother, when he was but two years old, Poe was adopted into the family of John Allan, of Richmond, Va. He was given a good education and was sent, finally, to the University of Virginia, from which, however, he was withdrawn by Mr. Allan, perhaps because of losses at gambling. After serving for two years in the United States army, Poe was sent to West Point, but was soon dismissed in disgrace. This caused a final rupture with Mr. Allan, and Poe was put upon his own resources. He married, in 1833, his young cousin, Virginia Clemm, and soon afterward he became connected with a magazine in Richmond, to which he contributed tales, poems and literary criticisms. He did not hold this position long, however, nor positions which he secured on other magazines, owing to unsteady habits and intemperance. The long illness of his wife, whom he loved devotedly, and her death in 1847 prostrated Poe, and from this time he drank more and more frequently. In October, 1849, he was found unconscious in a drinking place in Baltimore and was taken to a hospital, where he died.

EDGAR ALLAN POE

Poe's fame rests chiefly on his poetry, which is unsurpassed in its musical rhythm and its marvelously effective combinations of sounds. The best known of his poems are *The Raven, The Bells, Annabel Lee, Ulalume* and *To Helen.* The perfect art of his tales, of which *The Fall of the House of Usher, Ligeia, The Masque of the Red Death* and *The Gold Bug* are typical, gives Poe rank among the masters of short story telling of all time.

POET LAUREATE, *law're ate,* a title conferred by the English Crown upon a poet. The appointment is made by letters of patent, and there is no installation ceremony. While the position of laureate is official, there is only a nominal honorarium (in the case of Tennyson $500 a year), and there are no specific duties. However, the laureate, in recognition of the honor he has received, has often commemorated in verse important state occasions which have seemed worthy of such notice. Though there had been a number of minstrels and poets attached to the households and medieval English kings, some of them with pensions, the first poet formerly appointed laureate was Ben Jonson. The following lists shows all the poets laureate and the "volunteer laureates" who were their predecessors:

Name	Born	Appointed	Died
Geoffrey Chaucer	1340?		
John Gower	1325?		
John Kay			
Andrew Bernard			
John Skelton	1460?		
Richard Edwards	1523		
Edmund Spenser	1553		
Samuel Daniel	1562		
Ben Jonson	1573	1619	1637
Sir William Davenant	1605	1638	1668
John Dryden	1631	1670	1700
Thomas Shadwell	1640	1688	1692
Nahum Tate	1652	1692	1715
Nicholas Rowe	1673	1715	1718
Rev. Lawrence Eusden	1688	1718	1730
Colley Cibber	1671	1730	1757
William Whitehead	1715	1757	1785
Thomas Warton	1728	1785	1790
Henry James Pye	1775	1790	1813
Robert Southey	1774	1813	1843
William Wordsworth	1770	1843	1850
Alfred, Lord Tennyson	1809	1850	1892
Alfred Austin	1835	1896	1913
Robert Bridges	1844	1913	

PO'ETRY, one of the two great classes of literary production, the other being prose. According to the usual meaning of the term, poetry is rhythmical, imaginative language which appeals to the emotions and the artistic sense. As we think casually of the question, we take for granted that prose was the earlier form of literature. Molière in one of his comedies shows the surprise of an old man who discovers that he has been, all his life, "talking prose without knowing it;" but most of us are conscious that we "talk prose," and we see nothing wonderful about it. Prose is so much simpler and more natural than poetry, we think, and surely the early nations must have had a well-developed prose literature before they ventured to attempt poetry.

But when we study just a little way into the subject, we find that such was far from being the case. Centuries and centuries before there was any attempt to produce a prose literature, poetry flourished. And this, when we come to think of it, is natural enough; for just because the daily speech was so commonplace a thing, no effort was made to preserve it. It would have been, moreover, a difficult thing to hand down by word of mouth prose dissertations on any subject. With poetry the case was different. Every nation, it seems, has in its early stages naturally expressed itself in poetry. That does not always mean poetry such as we know so well to-day; it does not mean rhyme and a rythmic swing which our ears can recognize as such. But it does, in every case, mean something which had a rhythm to the ears of the people who produced it; something which could be sung or chanted to a musical accompaniment. For invariably, in its earliest stages, poetry belonged with music, and both were the outgrowth of religion. Hymns were sung to the gods, rhythmic accounts of their great deeds were chanted. Gradually, the figurative manner of speech, the musical form without the music, began to be used in writing of other things than religion. Naturally enough—for the step from the gods to the heroes was not a great one with primitive peoples—the deeds of the men of might were celebrated. Thus narrative poetry, the ambitious epic and the simple ballad were among the earliest forms of poetry.

These poems, or songs, were handed down by word of mouth from generation to generation, sometimes through centuries, before they were set down in writing. Thus, when we read an old ballad, such as the "Robin Hood" ballad given in these volumes in the article Language and Grammar, we may feel that we are reading what our ancestors in Great Britain, hundreds of years ago, heard repeated or chanted to the music of the harp, as they sat about their hearth fires.

Related Articles. The different forms of poetry described in these volumes, and various other topics pertaining to the subject, are listed below:

Acrostic
Alliteration
Ballad
Bard
Blank Verse
Didactic Poetry
Drama
Edda
Elegy
Epic
Idyl
Lake School
Literature (with list)
Lyric Poetry
Mastersingers
Meter
Minstrel
Minnesingers
Ode
Pastoral Poetry
Sonnet

POETS

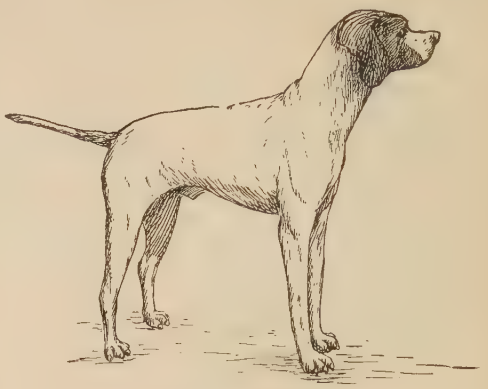
Addison, Joseph
Annunzio, Gabrielle d'
Arnold, Edwin, Sir
Arnold, Matthew
Austin, Alfred
Bradstreet, Anne
Bridges, Robert
Browning, Elizabeth Barrett
Browning, Robert
Bryant, William Cullen
Burns, Robert
Byron, George Noel Gordon
Camoes, Luiz de
Carleton, Will
Carman, Bliss
Cary, Alice and Phoebe
Chapman, George
Chaucer, Geoffrey
Coleridge, Samuel Taylor
Cowper, William
Dante Alighieri
Drummond, William Henry
Dryden, John
Dunbar, Paul Laurence
Emerson, Ralph Waldo
Field, Eugene
Fitzgerald, Edward
Fréchette, Louis Honoré
Goethe, Johann Wolfgang von
Goldsmith, Oliver
Gray, Thomas
Halleck, Fitz-Greene
Heine, Heinrich
Hemans, Felicia Dorothea
Herrick, Robert
Holmes, Oliver Wendell
Homer
Hood, Thomas
Horace
Howe, Julia Ward
Hunt, (James Henry) Leigh
Ingelow, Jean
Juvenal (Decimus Junius Juvenalis)
Keats, John
Key, Francis Scott

Kipling, Rudyard
Langland, William
Lanier, Sidney
Le Gallienne, Richard
Longfellow, Henry Wadsworth
Lowell, James Russell
Lytton, Edward Bulwer
McCrae, John
Markham, Edwin
Martial, (Marcus Valerius Martialis)
Masefield, John
Meredith, George
Miller, Cincinnatus Heine
Milton, John
Moore, Thomas
Morris William
Musset, Alfred de
Noyes, Alfred
Omar Khayyám
Ovid
Payne, John Howard
Pindar
Poe, Edgar Allan
Pope, Alexander
Procter, Adelaide Anne
Read, Thomas Buchanan
Riley, James Whitcomb
Rossetti, Christina Georgina
Rossetti, Gabriel Charles Dante
Ryan, Abram J.
Sachs, Hans
Sappho
Saxe, John Godfrey
Scott, Sir Walter
Seeger, Alan
Service, Robert
Shakespeare, William
Shelley, Percy Bysshe
Sidney, Sir Philip
Simonides
Smith, Samuel Francis
Snorri Sturluson
Southey, Robert
Spenser, Edmund
Stanton, Frank L.
Stedman, Edmund Clarence
Stevenson, Robert Louis Balfour
Swinburne, Algernon Charles
Tagore, Rabindranath
Tasso, Torquato
Tegner, Esaias
Tennyson, Alfred
Thomson, James
Timrod, Henry
Van Dyke, Henry
Virgil
Watts, Isaac
Whitman, Walt
Whittier, John Greenleaf
Wilcox, Ella Wheeler
Willis, Nathaniel Parker
Wordsworth, William
Yeats, William Butler
Young, Edward

POINCARE, *pwan ka ra',* RAYMOND (1860–), a President of France, prominent in international politics at the time of the World War. Before becoming President he held the office of Minister of Public Instruction and that of Minister of Finance. On becoming President, in 1913, he appointed Delcassé ambassador to Russia, and these two are largely responsible for the friendly alliance made at the time between that country and France and England. Upon honorable retirement from the Presidency in 1920 he was elected to the French Senate.

POINSETTIA, *poin set'i a,* a decorative plant of the spurge family, native to Mexico and Central America. It was introduced into the United States in 1835 by Dr. Poinsett of Charleston, S. C. The plant has a central upright, woody, green stalk, which often grows to be two feet high and which bears, horizontally, lance-shaped leaves, the lower ones green, those at the top bright crimson. A small inconspicuous yellow flower is produced at the tip of the stem. The plants, because of their brilliant coloring, are much in demand as Christmas decoration.

POINT'ER, a hunting dog, so called because it stops short at the sight of game and points toward it with its nose. It has a smooth coat of short hair, and is marked, usually black and white, like the fox hound. The tail is slender and stiff; the ears, large and drooping. The dogs have a very keen sense of smell and are unerring in locating game.



POINTER

POISON, *poi'z'n,* any substance which, introduced into the body, produces dangerous or deadly effects. Many poisons operate chemically, eating or corroding the tissues and causing inflammation and mortification. Examples of these irritants are many metallic oxides and solids, such as arsenic; many preparations of copper, mercury, antimony and other metals; the mineral and vegetable acids, and substances derived from some plants. Other poisons exercise a powerful action upon the nerves and cause the rapid destruction of their energy. These are acids or narcotic poisons, and most of them belong to the vegetable kingdom; alcohol, opium, hemlock, henbane and belladonna are those best known. Some substances, such as illuminating gas or the suffocating vapors from sulphur and charcoal, cause death by making breathing impossible (see ASPHYXIATION). The effect of poisons depends on the extent of the dose, some of the most deadly poisons being useful remedies, if taken under proper conditions and in right quantities. Modern science considers the germs that produce disease as poisons (see GERM THEORY OF DISEASE). Ptomaines are poisons obtained from eating spoiled foods (see PTOMAINES).

Treatment. Specific treatment for the most common poisons is given in the article ANTIDOTE (which see), but in treating all cases of poisoning, four things should be borne in mind:

(1) Neutralize the poison as quickly as possible by an antidote.

(2) If the poison has been introduced by the stomach; empty and wash that organ as quickly as possible.

(3) Overcome the action of the poison, let it be what it may, by stimulating the life forces in natural ways.

(4) Call a physician at once, and follow his directions implicity.

The stomach may be emptied by means of an emetic, but this should not be used if the poison has a strongly corrosive effect and it is feared that the tissues of the stomach have been injured. The most useful emetics are warm water and mustard, large quantities of warm milk, oils, butter, lard, soapsuds or a weak solution of salt and water. The emetic that is most available and will act most quickly is the one to use. If the poison was an irritant, the alimentary canal should be protected by giving such fluids as flaxseed tea, the white of eggs, milk and barley water. If the poison entered by way of a wound, as in case of a snake bite or dog bite, the first step should be to cleanse the wound. If there are no cuts or sores in the membranes of the mouth, the wound may be safely emptied by sucking it, providing the contents are quickly spit from the mouth and that organ thoroughly washed. A tight bandage should be promptly placed above the wound, which ought to be seared with a heated iron or some other cautery.

POISON GAS, the name applied to a military weapon used extensively in the World War. In April, 1915, during the Battle of Ypres, a vast, greenish-yellow cloud floated toward the allied trenches from the German lines. Canadian and Algerian colonial troops received the brunt of this strange new weapon, which caused the victim to gasp out his life in agony. In such manner did the Germans introduce into modern warfare a device that was destined to play an important part in the great struggle in Europe.

The gas used on the Ypres salient was a chlorine mixture. In preparation for an attack, cylinders weighing about ninety pounds, each containing about forty pounds of the gas liquefied by pressure, were placed under concealment in the front trench opposite the position selected. Lead pipes, bent into position, were attached to the cylinders, and were so adjusted that the openings pointed to the enemy. When wind conditions became favorable the pipe valves were opened and the fumes generated by the gas floated away to demoralize and torture the enemy troops. As the allies were taken wholly by surprise on the Ypres salient, the first gas offensive caused many casualties. Chlorine sears the lungs, and when it does not kill it usually leaves its victim broken in health.

After this innovation the gas shell made its appearance. Into the shell were charged certain liquids and solids, which by the use of T. N. T. or other explosive were converted into fine mist or dust clouds. The minute particles would cling to the clothing and ground and slowly evolve poisonous or irritating vapors. Among other devices used was a "tear shell," which contained a substance causing the eyes to water and producing temporary blindness. A shell containing a sneezing powder was another weapon used effectively, and in the German offensive of March, 1918, the so-called "mustard gas" caused many casualties. The latter was in reality a liquid giving off a heavy vapor which had very serious after-effects.

The allies in self-defense were forced to employ the same weapons, and they retaliated in good measure, using poison gas in huge quantities. As soon as the United States entered the war expert chemists began experimenting, under direction of the Bureau of Mines, and when the armistice was signed they had ready for use the most powerful poison at that time known—a liquid called methyl. This was said to be seventy-two times deadlier than the German mustard gas, and so powerful that a drop on the hand would cause death within a few hours. After the armistice was signed, the stock on hand was put into large iron containers, which were shipped to the seaboard and then dropped into the Atlantic Ocean fifty miles out from land. Another still more powerful gas called Lewisite, from its originator Lewis, was produced too late for America to use in the war.

Both allies and Germans devised some very ingenious masks to protect the soldiers from gas attacks. The typical mask was provided with a canister charged with chemicals which destroyed or neutralized the poisonous substances. The nostrils of the wearer were closed by a mechanical device, and the air was breathed through the mouth. It passed first through the canister, then through a flexible tube and mouthpiece. Expired air passed out through a valve which closed automatically during inspiration. The mask was a most disagreeable device to the wearer. See WORLD WAR.

POI'SON IVY, a climbing or training shrub, sometimes erect, with aerial roots and groups of three leaflets, each notched and commonly pointed. This plant is often confused with the Virginia creeper, which

POISON IVY

closely resembles it, but which has five leaflets. The poison ivy spreads rapidly by means of its roots and seeds, and it is a very poisonous weed. It blooms in the heat of summer, having yellow flowers about a quarter of an inch in diameter. In the autumn it becomes brilliantly colored.

POISONOUS PLANTS, those plants which are poisonous to the touch or when taken into the stomach. The name cannot cover a definite class of plants, because some plants that seem poisonous to one person are harmless to another; some plants that are poisonous when growing are harmless when cooked; some plants are eaten by animals and are feared by people. The poisonous juices of many plants make valuable medicine when properly prepared.

In North America there are several plants generally considered poisonous to the touch, among which are poison ivy and poison sumac, both of which to some persons are poisonous and to others are harmless, and the *Virginia creeper*, or five-leafed ivy, which, usually harmless, is noxious to some persons. There are many other plants scattered through different families, from fungi to the highest types of seed-bearing plants, which, if eaten, cause illness or even death. The mushrooms are probably the most dangerous, because of the resemblance between the poisonous and the edible species. Among the flowering plants which are poisonous are black nightshade, belladonna, henbane, poison hemlock and water hemlock. Among other plants of similar properties to be found in North America are hellebore, pokeweed, digitalis, lobelia and aconite. Nearly all of these are valuable in medicine.

Related Articles. Consult the following titles for additional information:

Aconite	Hemlock	Nightshade
Belladonna	Lobelia	Poison Ivy
Foxglove	Loco Weed	Pokeweed
Hellebore	Mushrooms	Sumac

POITIERS, *pwah tya'*, FRANCE, capital of the department of Vienne, on a peninsula formed by the junction of the Clain and the Boivre rivers, fifty-eight miles southwest of Tours. Its chief building is its twelfth-century cathedral, in the Gothic-Romanesque style of architecture. Poitiers is one of the oldest towns of France and has the remains of a Roman palace, Roman baths and an aqueduct. Other features of interest include a university and a municipal library of 65,000 volumes. Two famous battles were fought in its vicinity. The first was the battle in which Charles Martel defeated the Saracen army, in 732; the other, that between the French, under John II, and the English, under the Black Prince, in 1356, during the Hundred Years' War. Population, 1911, 41,242.

POKE'WEED, a perennial herb which grows to a height from four to six feet, and has widely branching purple stems which bear clusters of small white flowers and after them, purple, juicy berries. The young shoots are sometimes used medicinally; the roots are poisonous. The plant is variously called *garget, pigeon berry* and *inkberry*.

POKER, properly called DRAW POKER, an insidious gambling game, played with the ordinary deck of fifty-two playing cards, and sometimes with a joker, which is run "wild" and then matches any other card. Five cards constitute a "hand," and the value of a hand runs from a single pair up through two pairs, three of a kind, straight (five cards in sequence), flush (all hearts, all diamonds, all spades or all clubs), four of a kind, and straight flush to royal flush (ace, king, queen, jack, ten, of one suit). Many states have enacted laws against the game.

POLAND, an extensive territory of central Europe, which existed for many centuries as an independent and powerful state, but which, having fallen a prey to internal dissensions, was violently seized by Austria, Prussia and Russia, partitioned among these three powers and incorporated with their dominions. The partition of this great country and the oppression of its people constitute one of the great tragedies of history, and the world therefore viewed with sympathy the efforts of the Poles to reconstitute their state in the closing months of the World War. President Wilson declared that the liberation of Poland was one of the objects for which America was fighting, and the Paris peace conference, whose deliberations occupied the early part of 1919, found the question of the new Polish boundaries one of its major problems. Many conflicting demands were to be put before the League of Nations.

At the time of the first dismemberment of the country (1772), the Polish kingdom covered an area of 300,000 square miles between the Baltic Sea and the Carpathian Mountains. As reconstructed in 1918–1919 it was bounded by Germany, Baltic Russia, Russia proper, Ukrainia, Rumania and Czecho-Slovakia. The nucleus of this new state was Russian Poland. By the treaty presented to Germany that nation was ordered to cede to Poland, Posen and the province of West Prussia on the left bank of the Vistula. A vote was ordered taken in Silesia to determine how much of that province should revert to Poland. The boundary lines in the southeastern third of East Prussia and the districts along the North Vistula were to be determined by a vote of the residents. Poland was given access to the Baltic Sea through the port of Danzig, which, with the district immediately about it, was constituted a free city under the guarantee of the league of nations. At the time the treaty was presented to Germany the other Polish boundaries were not settled, as there were disputes with the Ukrainians and Czecho-Slovaks to be decided.

In the settling up of the new Polish republic the eminent pianist Jan Paderewski had a prominent place. Throughout the war he had devoted all of his time to helping his suffering countrymen, and in the fall of 1918 he took a leading part in erecting a provisional government which eventually secured allied recognition. In this task he coöperated with General Joseph Pilsudski of the Polish legion. In January, 1919, elections were held to choose delegates to a national assembly to be held at the capital city, Warsaw. On February 10 the newly elected members of the assembly took their seats and began the work of adopting a permanent constitution. In the provisional government Paderewski was Premier and General Pilsudski chief of state, charged with executing the decisions of the assembly.

History. The Poles, like the Russians, are a Slavonic race, and are first spoken of in history as the Polani, a tribe or people between the Vistula and the Oder. The country was divided into small communities until the reign of Mieczyslaw I (962–992), of the Piast dynasty, who renounced paganism in favor of Christianity, and who was a vassal of the German emperor. He was succeeded by Boleslaw the Brave (992–1025), who raised Poland into an independent kingdom and increased its territories. In succeeding reigns the country was involved in war with Germany, the heathen Prussians, the Teutonic Knights and Russia. For a time it prospered, on the whole, but an invasion by the Mongols in 1240 and 1241 brought it to a critical condition. Instead of a united kingdom, the country was now but a collection of independent principalities, which were constantly at war with one another. Under Ladislas I (1306-1333) Poland became again a united realm. The last of the Piast dynasty was Casimir the Great (1333–1370), during whose reign the material prosperity of Poland greatly increased.

He was succeeded by his nephew, Louis the Great, king of Hungary, whose daughter, Hedwig, was recognized as queen in 1384. She married Jagello, Prince of Lithuania, and thus established the dynasty of the Jagellons, which lasted from 1386 to 1572. During this period Poland attained its most powerful and flourishing condition. Sigismund I (1506–1548) was one of the greatest kings of the line, and he brought the country to its highest point of prosperity. In 1572 the Jagellon

dynasty became extinct in the male line, and the monarchy, hitherto elective in theory, now became so in fact. The more important of the elective kings were Sigismund III (1587–1632), Ladislas IV (1632–1648), John Casimir (1648–1669) and the Polish general Sobieski, who became king under the title of John III (see JOHN III SOBIESKI). He was succeeded by Frederick Augustus I, elector of Saxony, who got entangled in the war between Russia and Charles XII and had as a rival in the kingdom Stanislas Lesczynski. Augustus III (1733–1763) followed, and by the end of his reign internal dissensions and other causes had brought the country into a state of helplessness.

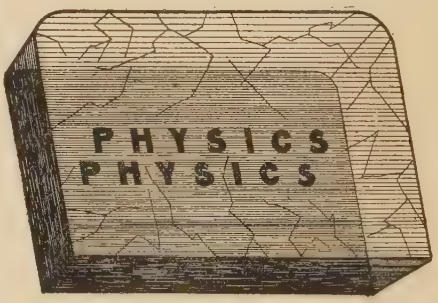
In 1772, under the last feeble king, Stanislas Augustus (1764–1795), the first actual partition of Poland took place. About one-third of her territories were seized by Prussia, Austria and Russia, Prussia receiving the Province of West Prussia, comprising an area of 13,415 square miles; Austria receiving Galicia and Lodomeria, 27,000 square miles, and Russia receiving part of Lithuania, 42,000 square miles. What remained to Poland was completely under Russian influence, despite the earnest struggles of the patriots under Kosciuszko. Another partition in 1793 gave Russia nearly 97,000 square miles and Prussia 22,500 square miles. Again the patriots rose, made Kosciuszko dictator and seemed in a fair way to succeed. Late in 1794, however, Kosciuszko was defeated at Maciejowice by the Russians and Prussians, and in the following year a third partition took place, by which Russia gained 45,000 square miles, Prussia 21,000 square miles and Austria 18,000 square miles. The last Polish king became a pensioner of the Russian court.

The Poles welcomed Napoleon, thinking that he would restore their liberty, and they furnished him a large number of men; but he was able to accomplish little in their behalf, and even the Duchy of Warsaw, which had been established under his suzerainty, lost its independent existence after the disastrous invasion of Russia in 1812. From 1815 to 1830 Russian Poland was a constitutional monarchy, with the emperor as king, but the Poles, seizing the occasion of the French Revolution, at the latter date rashly engaged in an insurrection, which only hastened their complete absorption in Russia. During the World War all of Russian Poland, and parts of Austrian and Prussian Poland were devastated, 300 towns and 20,000 villages having been destroyed. The new state will need economic help from stronger nations for years to come.

POLAR EXPLORATION. See NORTH POLAR EXPLORATION; SOUTH POLAR EXPLORATION.

POLARISCOPE, an apparatus which gives a ray of light a fixed plane of vibration. The essential parts of the instrument are two prisms made either of natural crystalline substances such as tourmaline or Iceland spar, or of a series of reflectors. See POLARIZATION OF LIGHT.

POLARIZATION OF LIGHT, a term applied in optics to certain changes a ray of light undergoes through reflection, refraction, or by passing through certain substances. Since light is produced by vibrations at right angles to the line in which the rays travel, if we could look at the cross-section of a ray of light we should see waves running from



DOUBLE REFRACTION

its center in every direction. A beam is said to be polarized when these vibrations are given a definite direction. The light vibrations have opposite poles, displaying different properties; those on opposite sides of the beam of light are alike, and those at right angles with one another are different. When a ray is passed through a tourmaline crystal the vibrations are given a fixed plane in two directions, at right angles with each other. Place two tourmaline crystals in the path of a ray of light, one in front of the other. Rotate one of them slowly, using the ray as an axis. At two stages in the rotation, 180° apart, the crystal will cast a shadow, showing that the light is obstructed; in a position at right angles with this, the light passes through.

Light is partially polarized by reflection and by refraction. Some substances, such as Iceland spar (calcite), have the property of

polarizing by double refraction; objects seen through them appear double, as shown in the illustration.

POLE, either extremity of the axis around which the earth revolves. The northern is the *north pole;* the southern, the *south pole.* Each of these poles is 90° distant from any point on the equator. In astronomy, the *celestial pole* is the name given to each of the two points in which the axis of the earth is supposed to meet the sphere of the heavens, forming the fixed point about which the stars appear to revolve. The star nearest this point in the northern heavens is the *Pole Star.*

In a wider sense, a pole is a point on the surface of any sphere equally distant from every point of the circumference of a great circle of the sphere; or a point 90° distant from the plane of the great circle, in a line passing perpendicularly through the center called the axis. Thus, the zenith and the nadir are the *poles* of the horizon. So the *poles* of the ecliptic are two points of the sphere whose distance from the poles of the world is equal to the obliquity of the ecliptic, or they are 90° distant from every part of the ecliptic.

Pole, in physics, is one of the points of a body at which its attractive or repulsive energy is concentrated, as the poles of a magnet, the north pole of a needle, the poles of a battery.

The *magnetic poles* of the earth are the points at which a magnetic needle varies 90° from a horizontal position, that is, stands vertical. It is not certain that this pole is positively stationary. The most recent observations concerning the north magnetic pole were made in 1906 by Captain Amundsen, who placed it in the neighborhood of latitude 70° north and longitude 100° west. See MAGNETISM.

POLE'CAT, a small animal of the weasel family. The common polecat is found in most

POLECAT

parts of Europe, except the extreme south. It is about seventeen inches long, with long, coarse brown fur, which grows blackish on the feet and tail. A superior kind of artists' brush is made from the hairs. The polecat possesses an odor something like that of the American skunk, and hence in the United States the skunk is often called the polecat. It is very destructive to poultry, rabbits, rats and mice, and also feeds on snakes, frogs, fish and eggs.

POLE STAR, or **NORTH STAR,** the brightest star of the constellation Ursa Minor, situated about 1° 20′ from the north celestial pole, round which it describes a small circle. It is of the second magnitude and is of great use to navigators in the northern hemisphere. Two stars, called the pointers, in the constellation Ursa Major (the Great Bear) always point in the direction of the Pole Star, and are the means by which it may readily be located. See BEAR, GREAT.

POLE VAULT, a sport wherein the participants leap over a horizontal bar with the aid of a pole, aiming to clear an easily dislodged bar which is supported by two uprights. The vaulting pole is made of lightweight, tough wood, and is from thirteen to fifteen feet long. The vaulter approaches the crossbar on a run, rests the end of the vaulting pole in the turf about eighteen inches from the bar, lifting himself into the air while thrusting his legs forward with the aid of the pole; he must surmount the bar without dislodging it.

POLICE, in the most common meaning of the term a body of trained men, organized by a municipality to maintain public order, preserve liberty and make life and property of the citizens secure against assault, burglary and other depredations. The organization of the police system varies in different countries. In most of the European countries it is military, and the head of the department is a member of the Cabinet. In England police commissioners are named by the Crown.

American Police Systems. In the United States and Canada the police constitute a department of the city government, and the force is organized under a superintendent, usually appointed by the mayor, or a board of police commissioners. Large cities, like New York, Chicago and Philadelphia, for instance, are divided into districts, which are subdivided into subdistricts and precincts. Inspectors or captains are in charge of the districts and subdistricts, and under them are lieutenants, sergeants and patrolmen, which

constitute the body of the force. There are also police surgeons, drivers of patrol wagons and such other assistants as the work of the department may require. Each officer is held responsible for the territory under his charge, and the captains are required to report every morning to the central office.

In the largest cities, besides the patrolmen, there are squads assigned to various duties, such as the sanitary police, who inspect buildings to ascertain their sanitary condition, report nuisances, and seize food unfit for consumption. Mounted police assist the patrolmen in handling the traffic in congested districts.

The detectives devote their time in detecting and arresting criminals and preventing crime. Since they do not usually wear a uniform, in the United States they are known as "plain-clothes men." In recent years women have been added to the police force in the larger American cities, and their work among women and girls is producing excellent results. Were the police force of such cities as London or New York mobilized in one body it would constitute a formidable array. The New York force exceeds 10,500 and is maintained at an annual expense of more than $10,000,000.

New York and Pennsylvania also maintain state police forces, whose authority is statewide.

POLITICAL ECONOMY. See ECONOMICS.

POLITICAL PARTIES IN THE UNITED STATES. Before the Revolutionary War there were practically no political parties in the English colonies. The issues which divided the people centered almost wholly upon the relations of the colonial governments to the mother country. With few exceptions, the colonists favored a larger measure of home rule than Parliament and the king were willing to grant. A few of the more wealthy colonists favored a stronger government by the king and less by local authorities. After 1760, the strictures on colonial government were more closely drawn. and the colonists who opposed these strictures took the name *Whigs,* because the Whigs in England favored their cause. Those who favored the steps taken by the home government called themselves *Tories,* after the Tories in England. Soon after the outbreak of the war nearly all the Tories left the country.

The Critical Period. During the progress of the war the Articles of Confederation (which see) were adopted. The operation of these articles soon gave rise to two parties —one composed of those who realized the inadequacy of the Articles of Confederation to hold the states together as a nation, and the other including the opponents of a stronger central government. The disasters following the close of the Revolutionary War soon gave the advocates of a stronger central government a large following, and they gained such strength as to enable them to call a convention for revising the Articles of Confederation. In this convention they were called *Nationalists,* and were strong enough to gain most of their points in forming the Constitution. The irreconcilable differences between the two parties were patched up by a series of compromises.

When the Constitution was placed before the states for adoption it caused a sharp alignment of political parties. The Nationalists who favored the constitution took the name *Federalists,* and their opponents were called *Anti-Federalists.*

The Federalists. Under the leadership of Washington, Hamilton, Jay, John Adams and others, the Constitution was adopted by the necessary number of states, and with the election of Washington, the Federalists came into power and exerted a controlling influence in the organization of the new government. For twelve years this party directed the affairs of the nation. During that time, however, there was a growing feeling, notwithstanding Washington's declarations, that the Federalists aimed to make the government eventually monarchical in form. This, coupled with the sympathy among a large number of people for the advanced democratic ideas finding expression in the French Revolution, together with certain acts passed under the Federalist administration disclosing a distrust of the people, led to the defeat of the party in 1801 and the election of Thomas Jefferson as President. The Federalists continued as the party of opposition until 1814 (see HARTFORD CONVENTION).

The Federalists made a lasting impression upon American institutions. They organized the Senate, the House of Representatives and the Federal Judiciary on plans that have continued to the present day, and they established foreign and domestic policies that have been followed by all administrations since the days of Washington.

The Republican Party of 1801. For twenty-five years the Anti-Federalists, under various names, held control of the government. Among their most illustrious leaders were Jefferson, Patrick Henry and George Clinton. Before his election, Jefferson had united his followers under the name *Republicans,* and after his election this name was applied to all factions which had united in opposition to the Federalists. The name was later changed to *Democratic-Republican* and finally to *Democratic,* and under this name the Democratic Party of which Jefferson was the founder has existed to the present time.

During this period, however, a change occurred in the general policy of the party. Whereas it had come into power as the party of the strict construction of the Constitution, circumstances compelled it to disregard its old principles at times and to interpret the Constitution more liberally than the Federalists ever had done, as in the expansion of territory by the Louisiana Purchase and in the Embargo and Non-Intercourse acts.

The Democratic Party. From the election of Jefferson in 1801, the Democratic Party won every Presidential election, except three, to 1860. These three exceptions were the election of John Quincy Adams by the National-Republicans in 1824, the election of William Henry Harrison by the Whigs in 1840, and the election of Zachary Taylor by the same party in 1848.

Though Monroe's administration is known as the "Era of Good Feeling," in reality party dissension continued throughout this period, and in fact became so bitter over the questions of tariff, internal improvements and the interpretation of the Constitution, that a large faction of the old party broke away from its allegiance and formed a new party, known as the National Republican, led by John Quincy Adams and Henry Clay. Many of the old Federalists supported the new party, and its candidate, Adams, was elected in 1824 over Andrew Jackson, the Democratic-Republican candidate. However, the growing demand for a "people's President," which was expressed in the popular candidacy of Jackson, grew to such proportions that the National Republicans were swept out of office, and Jackson was chosen President in 1828.

In 1832 all parties for the first time nominated their candidates for President at national conventions. Jackson was reëlected, but during his second administration the hold of the Democrats on the government was decidedly weakened through his open opposition to the United States bank, which had become an important part of the fiscal system of the country. However, in 1836, the Democratic candidate, Martin Van Buren of New York, was chosen President. Throughout Van Buren's administration the influence of the Democrats was constantly weakened, Congress was almost evenly divided between Whigs and Democrats, and the administration was constantly harassed by its inability to secure the passage of its measures.

The Democratic party had generally been united on national issues, but in 1820 it began to divide on the issue of slavery, the line being sharply drawn at the passage of the Missouri Compromise (which see). The issue became more and more prominent at each succeeding election, until the final break in 1860. The union of many Southern Democrats with the Whigs in 1840 carried the election in favor of General Harrison. But in 1844 the Democrats were successful, the chief issue of the election being the annexation of Texas. This was not accomplished, however, until after the Mexican War, which tended still further to divide both the leading parties along sectional lines. In 1848 Zachary Taylor, the Whig candidate, was chosen over Lewis Cass, the Democratic nominee. Before this election the party in New York had divided into two wings known respectively as the *Barnburners* and the *Hunkers.* The former united with the *Free-Soil* party and in so doing gave the electoral vote of New York to General Taylor, which secured his election. The controversy over slavery increased in bitterness with each succeeding Congress. President Taylor died in 1850 and was succeeded by Millard Fillmore, who was anti-slavery in his sentiments. During his administration the slavery question recurred in various forms, relating to the admission of new states, the power of Congress to restrict slavery in the territories, and the obligation of free states to return fugitive slaves to their owners. The most

important event of the period was doubtless the passage of the Compromise of 1850 and the Fugitive Slave Law, which seemed for a time to set the slavery question aside.

During Pierce's administration (1853–1857) the Kansas-Nebraska Bill (which see) caused a realignment of both parties. The Southern Democrats and Southern Whigs united in support of the measure, which practically took from Congress the power to regulate slavery in the territories. While the Northern Democrats were evenly divided concerning it, the Northern Whigs and Free-Soilers were united against it. The Democratic party reunited after this contest, but the Whigs were permanently divided, and soon after, the name disappeared from politics.

Although the Democrats were successful in the elections of 1852 and 1856 the breach between the North and the South continued to widen, and in the Presidential campaign of 1860 the party divided into two factions. The Dred Scott Decision, which practically opened all United States territory to slavery, aroused the North to the perils that might arise unless the slave power was checked. The wing of the party opposed to the extension of slavery nominated Stephen A. Douglas, and the Southern wing nominated John C. Breckinridge. There was also a *Constitutional Union* party in the field, with John Bell, of Tennessee, as their candidate. The division in the Democratic party resulted in the election of the Republican candidate, Abraham Lincoln.

Soon after the election of Lincoln several of the Southern states seceded and the Civil War (which see) followed. Although the Northern Democrats stood by the government during the Civil War, the party lost influence, and for a time had only a small minority in Congress. They contested every national election with the Republicans, but did not return to power until 1884, with the election of Grover Cleveland. Cleveland was defeated in 1888, but elected again in 1892. The financial depression that occurred during Cleveland's second administration caused general dissatisfaction. In the campaign of 1896, the Democrats nominated William Jennings Bryan of Nebraska, and went before the country advocating the free coinage of silver at the ratio with gold of sixteen to one. Several other parties were in the field, but the main issue was between the Democrats and Republicans. The Republican candidate, William McKinley, was elected. The tariff (which see) and other financial measures constituted the leading points of controversy at this and several other elections.

The Democrats did not return to power until 1912. As the result of the preferential primaries, the national Democratic convention of that year had two prominent candidates before it; these were Champ Clark of Missouri, who represented the conservative element in the party, and Woodrow Wilson of New Jersey, who represented the progressive element. After a long contest the progressive element won and Wilson was nominated. A division in the Republican party gave the Democrats an easy victory. At his inauguration President Wilson had a good working majority in both branches of Congress. During his first administration the Federal Reserve Bank law was enacted, and the tariff was revised in accordance with the Democratic policy of revision downward. Free trade, or a low tariff, is a cardinal principle of the modern Democratic party.

History shaped itself in an entirely unforeseen manner during the Wilson administration. The outbreak of the war in Europe in 1914 set in train a series of events that vitally affected American policies, both domestic and foreign. After keeping the country neutral until 1917, President Wilson broke off diplomatic relations with Germany when the latter country attempted to define and restrict American rights on the sea, and in April the United States entered the conflict as a belligerent.

The period of American participation in the war saw an extraordinary development of central authority. The administration, impelled by the necessity of creating a great war machine, assumed vast powers. The railroads and telephone and telegraph lines were placed under government control, all food dealers were forced to operate under licenses, and commodities, raw materials, factories and other sinews of war were commandeered. The people accepted these and like measures as necessary for the winning of the war; as a matter of fact, the United States was experimenting with state socialism and paternalism.

When the war ended a period of uncertainty followed. The signs pointed to a partial return to individualism; seemingly, however, there was in prospect a greater degree

of government regulation than prevailed before the war. Thus the party traditionally opposed to a strong central government carried the country farther toward centralization than had ever been attempted by the Republican party. This was the result of two vital factors—a war emergency and a President of commanding personality.

The Republican Party. The Republican party, organized at Jackson, Mich., in 1854, was the outgrowth of opposition to slavery. It was formed by the fusion of anti-slavery parties and factions, among them the Liberty Party, the Free Soil Party, Know Nothings, anti-slavery Whigs, anti-slavery Democrats and Abolitionists. The Republicans held their first national convention in 1856, and nominated John C. Fremont for President. Among their most prominent leaders were Abraham Lincoln, William H. Seward, Horace Greeley, Salmon P. Chase, Hannibal Hamlin and William Cullen Bryant, besides scores of others prominent in political life. Within two years the party secured a popular majority against slavery in fifteen states and elected eleven United States Senators. At the election in 1856 Fremont secured 114 electoral votes. By 1859 the party had gained a majority in the House of Representatives. At the election of 1860 it came into power with the election of Abraham Lincoln, and for fifty years, with the exception of the election of 1884 and of 1892, it managed the affairs of the nation.

The Republican party was at once confronted by the issues of the Civil War, but during the struggle the government was supported by most of the Democrats of the North. Before the election of 1864, enough of the "War Democrats" had become estranged to form a serious opposition. The Democrats nominated George B. McClellan, a popular general, and made their campaign on the assertion that the war was a failure. The Republicans nominated Lincoln, who was reëlected. On April 14, 1865, just as the war was coming to a close, President Lincoln was assassinated. Andrew Johnson, of Tennessee, a War Democrat, became President, and during the next four years all parties suffered the severest strain. Johnson immediately disclosed his disapproval of the reconstruction policy of Congress and, as a result of his fierce and tactless opposition, he was impeached, being saved from conviction by only one vote. However, the Democrats, who had approved his course, refused to support him in 1868, nominating Horatio Seymour, of New York, against a popular Republican candidate, General U. S. Grant.

Grant gained an overwhelming victory and furthered the Republican policy as outlined by Congress. During his two administrations, however, the opposition to the radical reconstruction policy gained strength and found expression in the *Liberal Republican* party, which, at its convention in May, 1872, nominated Horace Greeley, of New York, a former Republican. Grant was renominated by the Republican party, and, though the majority of the Democrats endorsed the Liberal Republican nomination, a few refused to follow and nominated Charles O'Conor. Grant received an overwhelming majority. During the second administration of President Grant, charges of corruption, involving many high officials, led to a serious rupture in the Republican ranks, and in 1876 the Democratic candidate, Samuel J. Tilden, gained a majority of the popular vote, though his Republican opponent, Rutherford B. Hayes, was chosen by an electoral commission, to whom were referred the returns from a number of disputed states.

Reconstruction was completed under Hayes, and the corruption which had been disclosed under his predecessor was so vigorously dealt with that the Republicans made decided gains in popular esteem. Their candidate, James A. Garfield, was elected in 1880 by a small plurality over Hancock, the Democratic nominee, and James B. Weaver, the Greenback candidate. Garfield was assassinated early in the following year and was succeeded by Chester A. Arthur. During his administration the tariff controversy, which had been constantly assuming greater importance since the Civil War, became the paramount issue, and the Democratic candidate, Grover Cleveland, was elected in 1884, over James G. Blaine, Republican. The houses of Congress were controlled by opposite parties during this administration, and but little was accomplished.

In 1888 Cleveland was succeeded by Benjamin Harrison and the Republicans again returned to power. The McKinley tariff, which was passed in 1890, and the Sherman silver law of the same year, proved unpopular, and as a result of a wide-spread educational campaign on the part of the Democrats, Cleveland was reëlected in 1892.

The issue between the free coinage of silver on the ratio of sixteen to one and the gold standard of coinage, combined with the general dissatisfaction over industrial conditions, gave the election to the Republicans in 1896, and William McKinley, author of the McKinley Bill, was seated in the Presidential chair. The Spanish-American War (which see) was the leading event of McKinley's administration, and may be considered epoch-making, since it radically changed the foreign policy of the government. The success of McKinley's administration led to his reëlection in 1900. He was assassinated in 1901 and Theodore Roosevelt succeeded him. Roosevelt was continued President in 1904, and throughout his two terms was remarkably successful in securing progressive legislation.

The contest in 1908 was between William Howard Taft, of Ohio, and Bryan, Taft being elected. Four years later, when Taft was renominated by the Republicans, the progressive Republicans formed a new Progressive party, and nominated Roosevelt for President and Governor Johnson of California for Vice-President. The Democrats nominated Woodrow Wilson and Governor Marshall of Indiana, who obtained a large electoral majority.

Other Parties. Since the adoption of the Constitution there have been two dominant political parties in the country, and one or the other has been in constant control of the government. From time to time, however, other parties have arisen and brought before the country issues not included in the platforms of the dominant parties. The most important of these are the following:

The Anti-Masonic Party. This party originated in New York and slightly influenced the elections in 1820 and 1826. It opposed the influence of secret societies in elections. It disappeared in 1831.

National Republican Party. This party was really a wing of the Democratic-Republican party. The party favored internal improvements, and a protective tariff. They elected John Quincy Adams in 1824, and nominated Henry Clay in 1831, but were defeated by the Democrats.

American Party, also called Know-Nothings. This party originated in New York and Philadelphia in 1835. Its main doctrine was opposition to the influence of foreigners in the government. The party attained its greatest prominence in 1852. The members were bound by a secret oath, and nominations were made in secret. From their declarations of ignorance as to the existence of the party and its proceedings, the members were given the name Know-Nothings, and this name was finally applied to the party. In the election of 1854 they carried most of the New England states, New York, Maryland, Kentucky and California, and polled a large vote in the South, but their influence rapidly declined, and many of the members joined the Republicans.

Whig Party. The Whig party was organized in 1834 by a coalition of the National-Republicans, the Anti-Masons and the Democrats who opposed Jackson's policies. Their most distinguished leaders were Daniel Webster and Henry Clay. At the time of their organization the Whigs favored a liberal construction of the Constitution, a protective tariff and a United States Bank. They were defeated in 1836, but in 1840 they elected General Harrison by a large majority. Harrison died soon after his inauguration, and his successor, Tyler, was unable to carry out the policies of the party. The party divided into Northern and Southern factions over the Mexican War, and was defeated in 1844. In 1848 the Whigs elected General Zachary Taylor, but again they were disappointed by the death of the President early in his term. The party became divided on the question of slavery, and was defeated in the Congressional elections of 1852. After this, most of those in the North joined the Republicans, while those in the South joined the Democrats.

Liberty Party. The Liberty party was organized to oppose slavery and was in existence from 1839 to 1848. It held three national conventions, but had no effect upon the results of national elections. It was merged with the Free-Soil party, and both joined the Republican party. William Lloyd Garrison was their most noted leader. John G. Whittier and Wendell Phillips were prominent members of these anti-slavery organizations.

The Constitutional Union Party. This party was founded in 1860 by the Southern Whigs, who would not unite with the Republicans or either wing of the Democratic party. Their platform was "The Constitution, the union of the states and the enforcement of the laws." They carried Kentucky, Tennessee and Virginia, but were destroyed by the Civil War.

Prohibition Party. This party was organized in 1869, and is still in existence. It has a peculiar record. Although it has never secured an electoral vote, it has seen the goal of its endeavor, namely national prohibition of the liquor traffic, accomplished by the ratification of the XVIIIth Amendment to the Constitution in 1919. Previous to the introduction of this amendment into the United States Senate, state after state had passed prohibition laws, and while the passage of these laws cannot be traced directly to the Prohibitionists, without doubt the influence of their vigorous denunciation of the liquor traffic was far-reaching in securing this legislation.

Greenback Party. The Greenback party was organized in 1874 by those opposed to the return to specie payments (which see). They

advocated the withdrawal of all national bank currency, the substitution of a currency issued by the government, and the use of coin for the payment of interest on the national debt only. The party secured no electoral votes and exerted no influence.

Populist Party or People's Party. This party, organized in 1891, was the outgrowth of the Grange and Farmers' Alliance movements, and its members were drawn chiefly from industrial classes. The platform demanded free and unlimited coinage of silver, national ownership of all public means of transportation and communication, the abolition of the national banking system, a graduated income tax and the election of United States Senators by the people. In 1892 their candidate for President received twenty-two electoral votes, and they elected a number of Congressmen. But before the next election much of their platform had been incorporated into the platforms of the Democratic and Republican parties, and their influence began to wane.

Socialist Party. The present Socialist party was formed in 1897 under the leadership of Eugene V. Debs (which see). It was the outgrowth of several other organizations, all having for their purpose the securing of better conditions for working men. Their platform was similar to that of the Populist party, but went further. They advocated equal suffrage for men and women, the establishment of the initiative, referendum and recall and the election of judges by the people. They have been successful in a number of local elections. In 1910 they carried the city of Milwaukee, and in 1912 polled nearly 1,000,000 votes for their candidate for President.

Progressive Party. The Progressive party was formed as result of a division in the ranks of the Republican party in 1912. Previous to the national convention of that year, there was a division in the party over the tariff and other issues. Many of the younger members of the party demanded a radical change in the management of its affairs. This demand was strenuously opposed by the older members, who were called standpatters, the other faction being known as insurgents. Some delegations to the national convention in 1912 were chosen at the primary elections and some by the old method of State conventions. As a result a number of states sent two delegations to the convention, and contests developed. The organization of the convention was in the hands of the standpatters, and in all contests they seated the delegation chosen by the old method. The defeated delegations, under the leadership of Theodore Roosevelt, organized the Progressive party, nominated Roosevelt for President, and Governor Johnson of California for Vice-President. The conservative wing renominated William Howard Taft. This split in the Republican ranks enabled the Democrats to win the election. At the election in 1916 the Progressives withdrew from the field, and most of them cast their votes for the regular Republican candidate.

Tomb in Nashville

POLK, *poke*, JAMES KNOX (1795-1849), an American statesman, eleventh President of the United States. He served but one term in office, but in his administration there were notable additions of territory to the country, and a foundation was laid for the marvelous development of the Far West. In this administration, too, the United States fought, in a brief conflict with Mexico, its first foreign war since the War of 1812.

Early Life. James K. Polk was born in Mecklenburg County, North Carolina, November 2, 1795. His father, a prosperous farmer, removed to Maury County, Tennessee, when James was eleven, and there the boy was given the best schooling available. Prepared for college by a private tutor, he entered the sophomore class of the University of North Carolina at the age of twenty, and was graduated with honors three years later. After a course in law he was admitted to the bar and began to practice in Columbia, the county seat of Maury County.

Early Political Career. The young lawyer had gratifying success from the start, and was soon a power in local Democratic politics, winning election to the state house of representatives in 1823 and a seat in Congress in 1825. In the National House he served as Speaker for the period of 1835-1839. In 1839 Polk was elected governor of Tennessee, but was defeated in 1841 and in 1843 for reëlection. His viewpoint on national issues he stated in his first inaugural address. He was opposed to a high tariff and to Federal taxes, and he deplored the Abolitionist movement as undermining the unity of the nation. At the same time, he was in no sense a proslavery man.

Presidential Candidate. In 1844 Polk received the Democratic nomination for President. He was a compromise candidate, but was generally respected for his high character and ability. There were two paramount issues before the people—the annexation of Texas and the settlement of the Oregon boundary. Spanish possession of Texas had been conceded by the United States in 1819, though there had been at attempt to include

Administration of James Knox Polk, 1845-1849

I. The President
- (1) Birth
- (2) Education
- (3) Political career
- (4) Character
- (5) Death

II. Foreign Relations
- (1) The "reoccupation" of Oregon
  - (a) Fifty-four forty or fight
    - (1) President claimed Oregon
      - (a) By right of discovery
      - (b) Treaty
      - (c) Settlement
    - (2) England claimed it on the same grounds
  - (b) Treaty of 1846
    - (1) By Pakenham and Buchanan
    - (2) Settled boundary at 49°
    - (3) Reserved Vancouver Island and allowed navigation of the Columbia to Great Britain
- (2) The "reannexation" of Texas
  - (a) Arguments for annexation
    - (1) Congress has power to admit new states
    - (2) Prevent England from securing domination
    - (3) The election interpreted as a demand for annexation
  - (b) Arguments against annexation
    - (1) Annexation by joint resolution unconstitutional
    - (2) Annexation by treaty unconstitutional
    - (3) Election of Polk should not be interpreted as settling the question
    - (4) Annexation of Texas meant war with Mexico
    - (5) It would increase slave area
  - (c) Texas accepts annexation
- (3) The Mexican War
  - (a) Causes
    - (1) Annexation of Texas
    - (2) Boundary dispute
    - (3) Expansion of the country to natural boundaries
  - (b) Events
  - (c) Treaty of Guadalupe Hidalgo
    - (1) Rio Grande fixed as the boundary
    - (2) United States paid Mexico $15,000,000
    - (3) United States to settle American claims against Mexico
    - (4) New Mexico and upper California ceded to the United States

III. Domestic Affairs
- (1) Tariff of 1846
- (2) Independent Treasury
- (3) Wilmot Proviso
- (4) New states and territory
  - (a) Iowa and Wisconsin admitted
  - (b) Oregon organized as a territory, 1848
  - (c) California organizes its own government
- (5) Discoveries and inventions
  - (a) Ether used as an anesthetic
  - (b) Sewing machine
  - (c) Cylinder printing press

Questions on Polk

Of what state was Polk a native?

What was meant by the phrase "fifty-four forty or fight"?

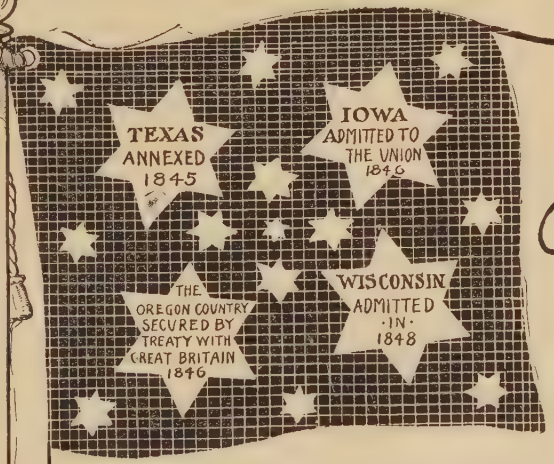
What part of the United States now has its boundary on this parallel?

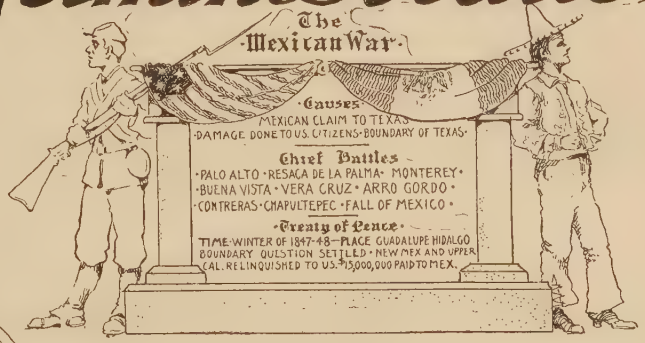
By what right did the United States claim Oregon?

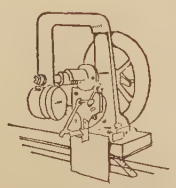
Name at least three arguments in favor of the annexation of Texas.

What were some of the arguments against annexation?

1845 Polks 1849 Administration


TEXAS ANNEXED 1845
IOWA ADMITTED TO THE UNION 1846
THE OREGON COUNTRY SECURED BY TREATY WITH GREAT BRITAIN 1846
WISCONSIN ADMITTED IN 1848


The Mexican War
Causes
MEXICAN CLAIM TO TEXAS
DAMAGE DONE TO U.S. CITIZENS-BOUNDARY OF TEXAS
Chief Battles
PALO ALTO · RESACA DE LA PALMA · MONTEREY · BUENA VISTA · VERA CRUZ · ARRO GORDO · CONTRERAS · CHAPULTEPEC · FALL OF MEXICO
Treaty of Peace
TIME-WINTER OF 1847-48—PLACE GUADALUPE HIDALGO
BOUNDARY QUESTION SETTLED · NEW MEX AND UPPER CAL. RELINQUISHED TO U.S. $15,000,000 PAID TO MEX.

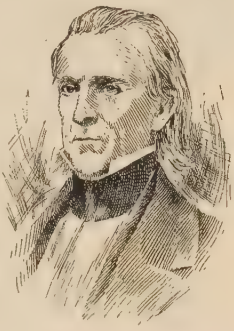


SEWING MACHINE
INVENTED BY HOWE-1845

HAPPENINGS

NAVAL SCHOOL FOUNDED AT ANNAPOLIS-1845-
SMITHSONIAN INSTITUTE ESTABLISHED-1846-
1ST OPERATION PERFORMED BY USE OF ETHER-1846-
HOE CYLINDER PRINTING PRESS INVENTED-1847-
SALT LAKE CITY FOUNDED-1849-

it in the Louisiana territory. In 1821, when Mexico secured its independence from Spain, Texas became a Mexican province. Then followed a great influx of American settlers, the establishment of a Texas republic and the agitation for its annexation to the United States. Polk declared for the immediate "reannexation" of Texas, for he believed that the region had once been a part of the United States. In regard to the Oregon boundary, which was a bone of contention between Great Britain and America, Polk took his stand on the "reoccupation" of Oregon. The United States claimed territory as far north as parallel 54° 40′, and the Democrats adopted as a campaign slogan the phrase "fifty-four forty or fight." The Whigs nominated Henry Clay; the antislavery men, James G. Birney. Polk won by 175 electoral votes, Clay receiving 105.



JAMES KNOX POLK

His Administration. The first notable event of Polk's administration was the admission of Texas as a state, on December 29, 1845. Disputes between Texas and Mexico on the question of the boundary line led to hostilities (for full details, see MEXICAN WAR), and in May, 1846, Congress voted money for the prosecution of war with Mexico. The American forces won a series of victories culminating in the capture of Mexico City in September, 1847, but the peace treaty was not signed until February, 1848. By its defeat Mexico was forced to cede to the United States over 525,000 square miles of territory. This acquisition served to make the slavery controversy more acute, as it opened the way to a vast extension of slave territory. The Wilmot Proviso, providing for the exclusion of slavery from states to be carved out of territory acquired from Mexico, was presented in Congress in August, 1846. It passed the House, but failed in the Senate.

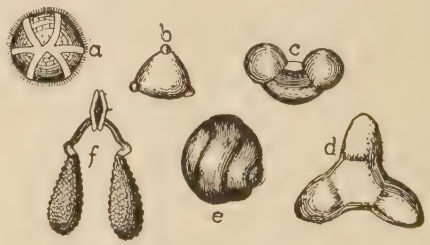
President Polk was content to have the Oregon question settled peaceably. Though elected on a "fifty-four-forty" platform, he did not oppose the acceptance of the compromise whereby the 49th parallel was made the boundary line. The negotiations to this end were completed in 1846. The same year Congress passed the Walker Tariff Bill, providing a tariff for revenue only, and an act reëstablishing the independent treasury system. Two Congressional appropriations for national construction work were vetoed by the President, who was decidedly opposed to the use of Federal funds for internal improvements which benefited only certain sections.

Other notable events of the administration included the admission of Iowa (1846) and Wisconsin (1848) as states, the organization of Oregon as a territory, the discovery of gold in California, the founding of Salt Lake City and the establishment of two important institutions—the Naval Academy at Annapolis, and the Smithsonian Institution at Washington. There was noteworthy progress in science and invention; Elias Howe received his sewing machine patent in 1846, and the following year the Hoe rotary printing press was invented. In 1846 ether was first used as an anesthetic in surgery.

Polk was not a candidate to succeed himself, and the election of 1848 was won by the Whig candidate, Zachary Taylor, the hero of the Mexican War. Polk died a few months after his retirement from office.

Related Articles. Consult the following titles for additional information:
Guadalupe Hidalgo, Treaty of
Mexico (history)
Naval Academy
Oregon (history)
Smithsonian Institution
Texas (history)
Wilmot Proviso

POL'LEN, the yellow dust formed on the anther of a flower, which when transferred to the stigma of the same flower, or another of the same species, fertilizes the ovules and causes seed to be produced. This dust is composed of minute cells, which, under the microscope, are seen to vary with species in shape and size. When one of these cells or grains falls upon the stigma, a fine tube protrudes from the sticky interior of the cell and penetrates the style to the ovule. The ovule then



POLLEN, ENLARGED
a, gourd, b, enchanter's nightshade; c, pine; d, evening primrose; e, musk plant; f, milkweed.

divides and develops an embryo, which ripens into a seed. This transference of pollen is called *pollination.*

Most plants are cross-fertilized; that is, reproduction depends upon the transference of pollen from one flower to another. In such case the pollen is carried by insects, birds, wind or other agencies. Plants that require to be cross-fertilized usually have brightly-colored flowers or sweet-scented blossoms containing nectar, to attract the insect. Bees are the chief agency in plant pollination; and nature, in providing this means of propagation, has made the bee so discriminating that it never mixes honey, but gathers a load of nectar from only one sort of flower, and so carries the golden pollen cells, which often are sprinkled over it like dust, where they are needed. When a flower contains both elements necessary for fertilization, the plant is said to be self-pollinated. See CROSS FERTILIZATION.

POLL TAX, a tax levied *by the head. Poll* is the old English word meaning *head.* Most taxes are levied on property or income; the poll tax, on the contrary, is one levied upon each person in a state regardless of his financial worth. The Congress of the United States has never levied a poll tax, but in most states of the Union there is such a tax, varying from fifty cents to three dollars. In some states a poll tax is prohibited by law.

PO'LO, a ball game played on horseback on the same principles as hockey. It is the most ancient of all games of stick and ball, having had its origin in Persia, where certain odes, believed to antedate the Christian Era, sang of the glories of the game. In England and America its introduction is of comparatively recent date, where it has found great favor among the wealthy.

The players drive the ball forward and backward by means of a mallet, or stick with a cigar-shaped head eight or nine inches long and two inches thick and with a crook at the end. These mallets are about four feet four inches long. The ponies are ridden at full speed and eight men try to drive the ball between the goals at opposite ends of the field. Good polo ponies are very expensive, for they must be quick, strong, active and thoroughly trained; in fact, a good horse takes as much interest in the game as his master and follows the ball with almost the same zest. The riders change their horses at the end of each period. See WATER POLO.

POLO, MARCO (about 1250-1324), a Venetian traveler, born of noble family. His father, Niccolo, and his uncle, Maffeo Polo, were merchant seamen, whose business took them to distant ports. On one of their trips they visited China, where they were well received by Kublai Khan. In 1271 they made a second trip to China, taking Marco with them. The boy rapidly learned the language and customs of the country and became a favorite with the Great Khan, who employed him on various missions to neighboring princes. He made him governor of a province in Eastern China, an appointment Marco held for three years. In 1292 the three Polos accompanied an escort of a Mongolian princess to Persia. Learning of Kublai's death, they resolved to return home, and they reached Venice in 1295. In the following year Marco Polo took part in a naval battle against Genoa, and was taken prisoner. During his captivity he dictated to a fellow prisoner an account of all his travels. After his liberation he returned to Venice, where he died. *The Book of Marco Polo* created a powerful thirst for adventure. Many believed that the wonderful stories were fabricated, but later travelers testified to their genuineness as history.

POLYGAMY, *po lig'a mi,* the practice of having two or more wives at one time. Polygamy was not prohibited in ancient Greece, but it was rare, the same thing was true of Rome and of the early Germanic peoples. Among many Eastern peoples, on the other hand, it was customary, and in certain cases was enjoined as a social duty. However, it was never general, as only the rich could provide for several wives. Mohammedans favor polygamy, as do the Mormons, who practiced it openly until 1890, when laws were passed forbidding it. See MORMONS.

POLYGON, *pol'i gon,* a plane figure bounded by straight sides. Polygons are called triangles, quadrilaterals, pentagons or hexagons, according as they have three, four, five or six sides. The sum of the bounding

POLYGONS

lines of a polygon are called the *perimeter.* The junctions of the sides of the polygon are called its *vertices;* the angles formed by the meeting of any two sides are the *angles* of the polygon. If the sides of a polygon are

extended they form angles outside the polygon, and these are called *exterior angles.* A polygon is said to be regular when all its sides are equal (equilateral) and all its angles are equal (equiangular). It is *convex* when none of its sides if extended would cut any other of its sides; it is *cross* when one boundary line crosses another. The area of a polygon is equal to the number of sides times the area of each triangle.

POLYNESIA, *pol i ne'shi a,* a term applied collectively to several groups of islands lying in the Pacific Ocean east of the 180th meridian, the international date line. Polynesia includes the Samoan, Tonga, Phoenix, Cook, Society, Marquesas and Hawaiian islands, as well as numerous smaller groups.

POLYP, *pol'ip,* the name of a group of minute water animals which commonly live in large colonies attached to stones or other anchorage at the bottom of salt or fresh water. The animals are very simple in structure, having soft, jellylike bodies with a fringe of wavy tentacles for grasping food. They increase rapidly, by budding, and a colony may attain treelike proportions. The jelly-fish and the fresh-water hydra, which belong to this family, live independent existences, moving about freely from place to place. See CORAL; COELENTERATA.

POLYPHEMUS, *pol i fe'mus,* in Greek mythology, the hideous giant with one eye in the middle of his forehead, whom Odysseus (Ulysses) encountered in the course of his wanderings after the Trojan War. He lived with his brother Cyclopes on an island, where all day he fed his flock, retiring at night to a cave by himself. On their voyage from Troy to Greece, Odysseus and his companions were cast ashore on this island, and they took refuge in the cave of Polyphemus. When the giant returned and discovered them, he rolled a huge stone before the door so they could not escape, and at once devoured two of his prisoners. In the morning before taking his departure he ate two more. As he rolled the stone before the door when he left the cave, Odysseus and his companions were obliged to remain shut up all day, but during this time they sharpened and hardened with fire a large stick, which they hid. After supper that night Ulysses contrived to make Polyphemus drunk, and while he was in a drunken slumber, Ulysses and his companions heated in the fire the sharpened stake and plunged it into the giant's eye. Blind and maddened with pain, Polyphemus was unable to seize any of his captives, and when in the morning he let his flock out, one by one, Odysseus and his companions having fastened themselves to the under side of the sheeps' bodies, escaped.

POL'YTHEISM, the belief in, and worship of, several gods; opposed to atheism and to monotheism, the belief in, and worship of, one god.

POMEGRANATE, *pum'gran ate,* a tree which bears an edible fruit and grows from eight to twenty feet high, producing numerous small, tough, highly flexible upright stems. It grows wild in Western Asia and parts of India and is cultivated extensively on Mediterranean shores and in the southern and western parts of the United States. The fruit, about the size of a large orange, has a very tough, russet-colored rind, and within this, occupying several compartments enclosed in dry, white, bitter pulp, are hundreds of small, bright-red pulpy seeds very juicy and often very acid. The Mexicans make from the juice a beverage which they call *aguadiente.*

POMERA'NIA, a province of Prussia in Northern Germany, lying along the Baltic Sea. Its area is 11,629 square miles, and the population in 1910 was 1,716,921. The interior is flat and in parts marshy. The principal river is the Oder, and the chief islands along the coast are Rügen, Usedom and Wollin. Although the soil is in general sandy, there are some rich alluvial tracts, which produce cereals, potatoes, beets and tobacco. Cattle raising is an important industry, and fish are taken in great quantities along the coast. The manufactures include glass, sugar, tobacco, woolen goods and distilled liquors. A considerable general trade is carried on, and this centers largely in Stettin, the capital of the province. Politically the province is divided into three districts, Stettin, Koslin and Stralsund.

POMERA'NIAN DOG. See SPITZ.

POMO'NA, among the Romans, the goddess of fruit and flowers. According to legend she was wooed by Vertumnus, who, receiving no encouragement, disguised himself as an old woman, hoping thus to learn her secret. Unsuspecting, she confessed her love, and he, throwing off his disguise, secured her promise to marry him. In art Pomona is represented with a basket of fruit.

POMONA, CALIF., in Los Angeles County, thirty-three miles east of Los Angeles, on the

Santa Fe, Southern Pacific and Pacific Electric railways. The city was named for the goddess of fruits, and is the center of one of the largest orange-growing regions in the world. Pomona is beautifully situated in the San Gabriel valley near the Sierra Madre Mountains and in a fertile irrigated area. There are a number of public buildings of note, including the Carnegie Library, the Masonic Temple and Pomona Valley Hospital. At Claremont, near by, is Pomona College. Pomona is an important fruit market, and the leading industries are connected with marketing and preserving fruit. The city has large packing houses, canneries and creameries. Pomona ships about 4,500 carloads of oranges and 750 carloads of lemons, besides quantities of other fruits and nuts, each year. The first settlement was made in 1875, and the commission form of government was adopted in 1911. Population, 1910, 10,207; in 1917, 13,624 (Federal estimate).

POMPADOUR, *pom pa door',* JEANNE ANTOINETTE POISSON, Marquise de (1721–1764), a mistress of Louis XV of France. Her father, a well-to-do general, gave her a good education and she was introduced into the best society. At the age of twenty she married Lenormant d'Etioles, and four years later attracted the attention of the king, who installed her at Versailles as his mistress and gave her the title of Marquise de Pompadour. For twenty years she ruled the king, long as his mistress and afterwards as political advisor and purveyor of amusements. Ambassadors, prime ministers and generals found it necessary to seek her favor. She retained her position until her death at Versailles at the age of forty-three.

POM'PANO, a fine food fish, bluish and silvery in color, that lives permanently about the Florida keys and comes north along the Atlantic coast to spawn in the spring. It is about eighteen inches long and is fished for with seines. There are a number of other species, elsewhere known as the pompano, among which is the highly prized *harvest fish,* that is found in the waters off Southern California.

POMPEII, *pom pa'ye,* an ancient city of Italy, which with Herculaneum and Stabiae was destroyed by the eruption of Mount Vesuvius in A. D. 79. For more than 1,500 years it lay undisturbed under its lava bed to a depth of twenty feet or more, with its site unknown and its name almost forgotten.

The ancient city of Pompeii was founded in the sixth century B. C., and was situated near the Bay of Naples, about twelve miles southeast of Naples and at the base of Mount Vesuvius, on its southern side. Before the close of the Republic and under the early emperors, Pompeii became a favorite retreat of wealthy Romans. In A. D. 63 an earthquake destroyed a great part of the town. Rebuilding was soon begun, but in A. D. 79 the terrible eruption of Vesuvius ended its history.

Pompeii was completely forgotten during the Middle Ages, and it was not until 1748, when a peasant, in sinking a well, discovered a painted chamber with statues and a number of other objects of antiquity, that an interest in the locality was excited. Since that time extensive excavations have been carried on, and for this purpose the Italian government has appropriated $12,000 annually for the prosecution of the work. A regular plan has been adopted, according to which the ruins are systematically explored and carefully preserved. About half of the city has now been unearthed.

In addition to the lava hurled by Vesuvius, there had been clouds of wet ashes and cinders, which, on drying, hermetically sealed up Pompeii. The buildings thus when brought to light were in a remarkable state of preservation. The excavations give a complete picture of the political and social life in a provincial city in Italy in the first century after Christ. The town was built in the form of an irregular oval, extending east and west. The circumference of the walls was about two miles, and these were pierced by eight gates. The streets were straight and narrow and are now paved with large blocks of lava. In the center is the open square or forum, around which are grouped the chief public buildings, including the Temple of Jupiter, the Temple of Venus, the Basilica, the Temple of Mercury, the Gladiators' Barracks and two theaters. Several interesting private homes have been unearthed, but not very many objects of great value have been discovered, as most of the inhabitants escaped during the eruption and carried with them their movable valuables. However, the Museum of Naples owes many of its interesting features to the ornaments, statues and other movable works of art found in the public and private edifices.

POMPEY, in full, GNAEUS POMPEIUS MAGNUS (106-48 B. C), a celebrated Roman general, who achieved distinction in arms at the age of twenty-three. In the struggle between Marius and Sulla Pompey raised three legions to aid the latter and regained for him the lost territories of Africa. On his return to Rome, Sulla greeted him with the surname of *Magnus* (Great), and Pompey received a popular ovation. After the death of Sulla, Pompey put an end to the war which the revolt of Sertorius in Spain had occasioned, and completed the subjugation of the forces of Spartacus. In 70 B. C., although not of legal age, and without official experience, he was elected consul, with Crassus. In 67 B. C. he cleared the Mediterranean of pirates and destroyed their strongholds on the coast of Cilicia, and two years later, in command of the army, conquered Mithridates, Tigranes and Antiochus, subdued the Jews and took Jerusalem by storm. He returned to Italy in 62 and disbanded his army, but did not enter Rome until the following year, when he was again honored with a triumph.

To strengthen his position, Pompey formed with Caesar and Crassus a coalition that came to be known as the First Triumvirate. At about the same time he married Caesar's daughter Julia. During Caesar's absence in Gaul, Pompey ingratiated himself with the Senate, was appointed sole consul and had the most important state offices filled with Caesar's enemies. Caesar was proclaimed an enemy to the state, and his rival was appointed general of the army of the Republic. Learning of this, Caesar crossed the Rubicon in 49 B. C. and in sixty days he was master of Italy without striking a blow. Pompey crossed over to Greece, and in that country, on the plains of Pharsalia, occurred the decisive battle which made Caesar master of the Roman world. Pompey fled to Egypt, where he hoped to find a safe asylum; but on landing he was stabbed by one of his former centurions.

Related Articles. Consult the following titles for additional information:

Caesar, Caius Julius	Rome
Crassus, Marcus L.	Spartacus
Lepidus, Marcus A.	Sulla, Lucius
Marius, Caius	Triumph
Mithridates	Triumvirate

POMPEY'S PILLAR, a celebrated column near Alexandria, Egypt. It is a monolith of red granite resting upon a pedestal about fifteen feet high; the total height is approximately ninety-eight feet. It was erected in A. D. 302 by Publius, eparch of Egypt, to celebrate Diocletian's remission of part of the grain tribute. The name of the pillar is only an invention of tourists.

PONCE DE LEON, *pon'tha da la ohn'* JUAN (1461-1521), one of the early Spanish explorers in America, remembered chiefly because of his search for the "Fountain of Youth." He accompanied Columbus on his second expedition in 1493, became governor of the port of the island of Hispaniola (Haiti), and later conquered Porto Rico and became governor of that island. Having there amassed great wealth, he set out for a country to the north, where he had heard there was a fountain having wonderful restorative powers. He reached land near the mouth of the Saint John River on Easter Sunday (1513), a day in Spanish called *Pascua Florida,* and named the country accordingly. He sailed around Florida Keys and up the western coast, and believing he had discovered an island returned to Spain and secured permission to conquer and colonize the new territory. In 1521 he proceeded to take possession of his province, but the natives were hostile, and in combat with them Ponce de Leon was mortally wounded.

PONTCHARTRAIN, *pon char trayn',* a lake of Louisiana, five miles north of the center of New Orleans. It is about forty miles long and twenty-five miles wide. It communicates with Lake Borgne, Lake Maurepas and the Mississippi River and, by means of a canal, with New Orleans. Steamers pass from this lake through the Rigolets Pass into Lake Borgne and the Gulf of Mexico.

PON'TIAC (1720–1769), a famous chief of the Ottawa Indians. He organized a confederation of tribes, including the Potawatomis and Ojibways, in the Mississippi Valley, from the Great Lakes to the Gulf of Mexico, to make war on the whites, who had encroached on his territory. In 1763 many forts were captured, and the settlers were massacred. Only Niagara and Detroit withstood the sieges and the fierce assaults. After peace was declared between France and England, Pontiac, in 1765, also made peace. He was murdered by a Kaskaskia Indian in 1769, and the Ojibways avenged his death by practically exterminating the Illinois tribes. Parkman's *Conspiracy of Pontiac* is a fascinating history of the great chief and his remarkable confederacy.

PONTIAC, MICH., the county seat of Oakland County, twenty-five miles northwest of Detroit, on the Clinton River and on the Grand Trunk, the Michigan Air Line and the Pontiac, Oxford & Northern railroads. In the county are several hundred picturesque lakes, which afford good fishing and hunting and have on their shores many hotels, clubhouses and fine summer residences; twelve are near the city. The surrounding region is agricultural, and the city contains carriage factories, the Oakland automobile factory, machine shops, a foundry, flour and lumber mills, a knit goods factory, gas engine works and other establishments. The Eastern Michigan Asylum for the insane is here, and the city has a high school library and the ladies' library and a hospital. The place was settled about 1818, was named in honor of the Indian chief Pontiac, and was chartered as a city in 1861. The commission form of government was adopted in 1911. Population, 1910, 14,532; in 1917, 18,006 (Federal estimate).

PONTOON BRIDGE, a temporary bridge consisting of a board walk or roadway resting upon floating supports, called *pontoons*. The supports may be flat-bottom boats, but in military usage they are often metal cylinders or floats made of canvas. These bridges are often necessary in times of war, and in modern armies there are special pontoon divisions, trained to construct these bridges, and carrying a supply of equipment necessary for their building. So easily is the mechanical apparatus put together and so rapidly is the work done that a body of well-trained soldiers can span a river at the rate of about a hundred feet in twelve minutes.

POODLE, *poo'd'l*, a little, long-haired lap dog, popular in all parts of the world. The thick hair is silky and either curls or hangs in ropes. The eyes are black and vivacious and bespeak an intelligence which makes the dog popular.

POOL, a game played on a table which differs from the common form of billiard table only in having six pockets, into which the balls may roll. These pockets occupy the four corners of the table and the middle of each side. There are a number of different games of pool, of which the following may be considered the more important.

Fifteen-ball pool is a game played with one cue ball and 15 object balls. At the beginning of the game these object balls are put in a frame and arranged in the form of a triangle in the middle of the foot of the table, with the apex pointing toward the players. The first player shoots from the head of the table at the triangle of balls and endeavors to knock them into the pockets. If he succeeds in putting one down, he shoots again, and so on until he misses a shot, when his opponent takes his turn, shooting from where the cue ball lies. After this manner the game is continued until all the balls are in the pockets. Then each player counts as many points as he has put balls into the pockets. If at any time a player knocks the cue ball into a pocket, one of the balls which he has put down is placed on the table again at the foot. The next player places the cue ball again at the head of the table and shoots as at the beginning of the game. It is customary to *call the shot*, that is, to indicate the pocket into which an object ball is to be driven. In the common form of the game, all of the object balls are of uniform red, but the game may be modified by having the object balls of different color, each bearing a number, in which case the count is made according to the numbers on the balls which are put into the pockets. Any number of people from two to a half-dozen may play the game.

Pin pool is played on a regular pool table or on a billiard table. Five small pins are placed in the center of the table on five spots, which are numbered as in the following diagram, in which the number 1 is toward the head of the table:

4
3 5 2
1

Each pin counts as many points as are indicated by the number of the spot on which it stands. Three balls are used, two object balls and a cue ball. At the beginning of the game the two object balls are placed on spots at the ends of the table, and the pins are placed in the center. The cue ball is shot from the head of the table at the farther object ball, with the purpose of knocking down the pins with either of the balls, after hitting the object ball. At the beginning of the game each player is given, usually from a leather bottle, a small ball, on which is marked a number. This number the player counts as the beginning of his score, but makes no announcement of it unless he wins the game, which consists of exactly 31 points. If a

player's score becomes greater than 31 he "bursts" and loses all that he has made and must begin over. Whenever the pins are knocked down, they are put back upon the spots where they originally stood. If in any shot the player knocks down the four outer pins, leaving the center one standing, he wins the game. Any number may play.

Other Games. Other games which are modifications of the two pool games described are numerous. Sometimes the leather bottle, one pin and an object ball are used, and the bottle and pins are set upon the table where they fall, the former counting 10 and the latter 5, and the game being any number previously determined on. A different game may be played on the regular pool table, in which four balls are used, one counting 5, another, 3, and a third, 1, when put into the pockets. In this game the player scores also regular billiard shots. If the cue ball is put into the pocket at any time the player loses all he has made in that turn and must give way to the next player. Whatever the number fixed for the limit of the game, it must be made exactly. If the person makes too many points, he loses all that were made in that turn.

POOLE, William Frederick (1821–1894), an American librarian, born at Salem, Mass., and educated at Yale College. In the course of his college term, and while serving as a librarian, he compiled the first edition of his well-known *Index to Periodical Literature,* of which many subsequent editions and supplements were published. After graduation he became successively librarian of the Boston Mercantile Library, of the Athenaeum, of the Cincinnati Public Library, the Chicago Public Library and the Newberry Library, Chicago. He organized serveral large libraries, including that of the United States Naval Academy at Annapolis. He was prominent in the larger library activities and was a historian of some note. At one time he was president of the American Library Association. His writings include *The Battle of the Dictionaries, Cotton Mather and Salem Witchcraft* and *Anti-Slavery Opinions Before 1800.*

POONA, British India, a well-built city of Bombay Presidency, is situated on the River Mutha, about seventy-five miles southeast of Bombay. It has the Deccan College for classics, mathematics and philosophy; a government college of science, with special training in civil engineering; normal schools, and other educational institutions, together with a public library and a hospital. Poona was formerly the capital of the Peshwa, head of the Mahratta confederacy. The city stands 1,850 feet above the sea, and is a health resort. For a part of the year it is the seat of the Bombay government. Two miles from the city are cantonments for the army. Its manufactures include gold and silver jewelry, small ornaments in brass and ivory, and silk and cotton fabrics. It is an important military station, and good roads connect it with other cities. Population, about 160,000.

POOR RICHARD'S ALMANAC, a popular almanac published by Benjamin Franklin from 1732 to 1757, under the assumed name of "Richard Saunders." The almanac contained, in addition to the usual almanac material, numerous proverbs, maxims, and a fund of commonsense advice. About ten thousand copies of the almanac were sold annually, and it exerted a wide influence in the colonies. See Franklin, Benjamin.

Statue of St. Peter, in St. Peter's

POPE, the name given to the bishop of Rome, the head of the Roman Catholic Church. The Emperor Phocis decreed that to the Roman pontiff exclusively belonged the distinction of universal bishop. Saint Peter is regarded as the first of the pontiffs of the Roman Catholic Church, because of Christ's words, "And I say to thee; That thou art Peter, and upon this rock I will build my Church; and the gates of hell shall not prevail against it." According to tradition, Peter planted a church at Rome and died there a martyr.

The Pope is elected by a two-thirds vote of all the cardinals, who assemble as the college of Cardinals for that purpose. See Sacred College.

Early History. Leo I, surnamed the Great (440-461), aimed to establish in the East and West a system of Papal vicariates, through which the Roman jurisdiction could be enforced and the Roman forms of faith permanently maintained. In the West he succeeded, but in the East his success was only partial and temporary. In 451 the Council of Chalcedon accepted the creed formulated by Leo, stating fully and clearly the belief in the

union of the divine and human natures of Christ in one person. The fact that in 452, armed with none but spiritual weapons, Leo went out to meet the terrible Attila and actually induced him to leave Italy without attacking Rome, is a convincing proof of the faith of the Pope and the power of the Church at this time.

During the German occupation of Italy, the relations of the Popes with the barbarian rulers were friendly, and the Church continued to prosper. Under the Byzantine sovereignty, the prestige of the Church seemed in danger of disappearing. But this calamity was averted by the invasion of the Lombards, who drove the Byzantine garrisons from the country. During the following centuries of change, confusion and ruin, the Christian Church alone retained its organization. Even the Lombards were in time converted to Christianity, and the people who, until the overthrow of the emperor, had been accustomed to depend upon Rome for guidance in temporal affairs, now continued to look thither for spiritual control, and the bishop of Rome was acknowledged throughout Western Europe as the head of the Church. Thus for centuries the Papacy gained strength, the Christian fathers, Augustine, Gregory the Great, and a host of other active men, shaping its doctrines and policy. In 754 Pepin I, the Frankish king, expelled the Lombards from their recent conquests and guaranteed to the Papacy the temporal sovereignty of a stretch of territory including Rome, and a considerable surrounding country (see PAPAL STATES).

In the year 800, Pope Leo III crowned Pepin's son Charlemagne Holy Roman emperor, thus restoring the Western Empire. Many causes now combined to extend the power of the Church. During the political strife of the Dark Ages the Church afforded a refuge to the oppressed. In the convents and monasteries alone did learning flourish. Priests were therefore the teachers, secretaries and ambassadors of kings.

Gradually the bishops acquired the right to try all cases relating to marriage, trusts, perjury, simony, or concerning widows, orphans or Crusaders, and even some criminal cases. Thus by the end of the twelfth century the Church had absorbed not only the whole legislative power over the clergy, but in part over the laity also. Consequently, the principle was established that all cases might be appealed from the courts of the bishops and archbishops of the different European countries to the Pope. The Pope thus came to be regarded as the fountain of justice and the supreme judge of Christendom, while emperors and kings bore the sword simply as his ministers to carry into effect his sentences and decrees.

Influence of the Crusades. In the tenth century, when Otto the Great assumed the title of Holy Roman Emperor, there began between the Pope and the emperor a contest for supremacy which lasted many centuries. During this time all Christendom was virtually divided into two parties, the members of which were respectively supporters of the imperial or the papal claims. The Crusades greatly strengthened the papal power, as the prominent part which the Popes took in them naturally fostered the papal authority, by placing in the hands of the Popes the armies and resources of Christendom and accustoming the people to look to them as guides and leaders.

Reforms of Gregory VII. Pope Gregory VII, or Hildebrand, by means of excommunication and interdict, carried on two important reforms, the enforcement of celibacy among the secular clergy and the suppression of simony, thus doing much toward establishing the universal spiritual and temporal sovereignty of the Pope. In the thirteenth century the papal power gained a signal triumph over the imperial party by its victory over the House of Hohenstaufen. In the period which follows, the authority of the Popes was at its height. Under Pope Innocent III (1198-1216), almost all the kings and princes of Europe swore fealty to the Pope as their overlord.

Removal of Papal Chair to France. One of the severest blows given both the temporal and the spiritual authority of the Popes was the removal in 1309 of the papal chair from Rome to Avignon, France. During the seventy years or so while it remained there, all the Popes were French and, their policies being shaped according to French ideas, the Papacy ceased to possess that sacred cosmopolitan character which had hitherto characterized it. The Catholic world was not again united under a spiritual head until the election of Martin V in 1417. But the temporal rulers of France, Germany and England, taking advantage of the disturbed condition of the papal see, successively revolted and freed

themselves from the authority of the papacy as touching political or governmental affairs. They continued, however, to recognize the Pope as the head of the Church and the rightful arbiter in all spiritual matters. In the sixteenth century the Popes took such a prominent part in the political movements of Europe that their territory and jurisdiction were greatly extended, but the opposition which had been slowly gathering in the North culminated in the Protestant Reformation, which directly challenged the traditional supremacy of the Papacy. The answer of the Church was clearly set forth in the decrees of the Council of Trent (1543–1553), which reaffirmed in unmistakable terms the beliefs of the Church of Rome.

Recent Changes. At the close of the eighteenth century and in the nineteenth changes took place in Europe which closely affected the papal power. In 1797 the Pope was obliged to cede several of the states of the Church to Napoleon. A year later the remaining Papal States were erected into a Roman republic, but in 1801 the papal power was partly restored over them. In 1808-1809 they were incorporated in the French Empire, but were again restored by the aid of the Austrians in 1815. When Pius IX ascended the papal throne in 1846, his chief aim was to bring about a confederation of the Italian states under the papal supremacy. With this object in view, he placed himself at the head of the movement for reform, reorganized the municipal government of Rome and granted a constitution to the Papal States. In 1848 Pius was forced to flee to Gaeta, while Rome was proclaimed a republic. In 1850 he was restored to his rightful place by the aid of the French.

In 1860 a large part of his dominions was annexed by Victor Emmanuel, and in 1870 the remnant of the Papal States voted for union with the kingdom of Italy, depriving the Pope of dominion. In accordance with the conviction of Roman Catholics generally, that it is not fitting that the head of the Church be subject to any temporal ruler, the Pope has since 1870 remained in the Vatican, where his jurisdiction is still supreme. In spiritual matters, the papal authority has, however, never been stronger than since the opening of the twentieth century, and even in temporal affairs the papal influence continues to make itself felt through the Pope's vicegerents in every land.

By the decrees of the Vatican Council of 1870, the Pope has supreme power in matters of discipline and faith over all and each of the pastors and of the faithful. It is further taught by the Vatican Council that when the pontiff speaks *ex cathedra,* that is, when he, in virtue of his apostolic office, defines a doctrine of faith and morals to be held by the whole Church, he possesses infallibility, by divine assistance. The Pope cannot annul the constitution of the Church as ordained by Christ. He may condemn or prohibit books, alter the rites of the Church and reserve to himself the canonization of saints. A Pope has no power to nominate his successor, election being entirely in the hands of the cardinals, who are not bound to choose one of their own body. The papal insignia are the tiara, or triple crown, the straight crosier and the pallium. The pontiff is addressed as "Your Holiness."

Table of Popes. We subjoin a table of the Popes, according to the Roman Notizie, with the dates of the commencement of their pontificates. The names following a dash are those of anti-Popes.

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Gregory X 1271
Innocent V 1276
Adrian V 1276
John XIX or XX or XXI 1276
Nicholas III 1277
Martin IV 1281
Honorius IV 1285
Nicholas IV 1288
(See vacant 2 years and 3 months.)
St. Celestinus V.1294
Boniface VIII ...1294
Benedict XI 1303
Clement V (papacy removed to Avignon) 1305
(See vacant 2 years and 3 months.)
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Pius IV 1559
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Sixtus V 1585
Urban VII 1590
Gregory XIV ...1590
Innocent IX 1591
Clement VIII ...1592
Leo XI 1605
Paul V 1605
Gregory XV 1621
Urban VIII 1623
Innocent X 1644
Alexander VII ..1655
Clement IX 1667
Clement X 1670
Innocent XI 1676
Alexander VIII..1689
Innocent XII 1691
Clement XI 1700
Innocent XIII ...1721
Benedict XIII ..1724
Clement XII 1730
Benedict XIV ...1740
Clement XIII ...1750
Clement XIV ...1769
Pius VI 1775
Pius VII 1800
Leo XII 1825
Pius VIII 1829
Gregory XVI ...1831
Pius IX 1846
Leo XIII 1878
Pius X 1903
Benedict XV 1914

POPE, Alexander (1688-1744), an English poet, the most influential of his age. As he was sickly and deformed, his education was desultory. He picked up the rudiments of Greek and Latin from the family priest and supplemented this and subsequent schooling in private institutions with much unsystematic reading. Before he was fifteen he attempted an epic poem, and by the time he was eighteen he had finished a volume of *Pastorals,* which attracted notice. In 1711 he published a poetical *Essay on Criticism,* which was followed by *The Rape of the Lock,* a polished and witty narrative poem, founded on an incident of fashionable life. His next publications were *The Temple of Fame,* a modernization and adaptation of Chaucer, a pastoral poem, and *The Epistle of Eloisa to Abelard.* From 1713 to 1726 he was engaged on a rhymed translation of the *Iliad* and the *Odyssey,* the latter being accomplished with the aid of assistants. The *Iliad,* while a clever production, does not reproduce the spirit of the original. The critic Bentley, on first reading the translation, said, "It is a pretty poem, Mr. Pope, but you must not call it Homer." In 1728 Pope published *Dunciad,* a mock heroic poem, intended to ridicule his detractors; and in 1742 he added to it a fourth book, in which he lampooned Colley Cibber, then poet laureate. The *Dunciad* was followed by *Imitations of Horace* and by *Moral Essays,* one of which was the much quoted *Essay on Man.*

In his own day, Pope was considered the greatest of English poets. Later judgment

has modified this estimate considerably, and some critics hold that Pope was not a poet at all, in the true sense of the term. But while he had little genuine feeling and little imagination, he possessed the art of turning a neat phrase; and his platitudes, expressed in rhyming couplets, have been oftener quoted than any other utterances in English except Shakespeare's.

POP'LAR, a genus of trees belonging to the same family as the willow. Twenty-five species are known, eleven of them being native to North America. The poplars are rapidly-growing trees, and they form extensive forests in low lands and on the slopes of mountains. The heart-shaped leaves are pale green above and silvery beneath, and are attached to long leaf-stalks which are flattened at right angles to the blade, giving the leaf a tremulous motion. This characteristic of the poplar gave rise to the expression "trembling like an aspen leaf," the aspen being a well-known species of poplar. The flowers appear in long, yellowish-red catkins, and the tiny seed is attached to cottony filaments by which it is carried through the air. The bark is pale gray or reddish-brown and the wood is light, soft and brittle. It is used in making packing cases, and is valuable for paper pulp. The *cottonwood,* the *aspen,* the *balm of Gilead* and the *Lombardy poplar,* with its upward-pointing branches, are the best-known species.

POPLIN, *pop'lin,* a dress fabric consisting of a warp of silk and a weft of worsted. The weft is heavier than the warp, and the result is a corded surface. The material is stout and strong and at the same time soft and elastic. Poplins are dyed in various colors, and they have a wide usage, not only as dress goods but also as upholstering material.

POPOCATAPETL, *po po'kat a pet'l,* a volcano in Mexico, practically dormant since 1548, situated forty miles from Mexico City, from which it is visible. It is cone-shaped and capped with snow, and below the snow line covered with forests. The crater, about 2,600 feet in diameter and 600 feet deep, contains deposits of purest sulphur. The volcano emits clouds of smoke and ashes, hence its Aztec name, which means *smoking mountain.*

POP'PY, a plant originating in the Far East, highly valued for its beauty and as the source of opium. It is hardy and easily cultivated, and the flowers, both single and double, are bright and showy; though the blossoms shatter quickly, they are rapidly replaced by others. Poppies grow easily from seeds sown broadcast; in parts of Europe they grow wild. Among the most ornamental species are the *Iceland Poppy,* which is orange or yellow; the *Oriental poppy* and *corn poppy,* both bright red, and the *California poppy.* The *opium poppy* is white (see OPIUM). In addition to opium, it produces an oil, contained in the seeds, which is used in Europe as fertilizer and cattle feed. The roots of the poppy are annual or perennial; the calyx is composed of two leaves, and the corolla has four petals; the stamens are numerous, and the capsule is one-celled, with several longitudinal partitions and a multitude of seeds. Because of its narcotic principle, the poppy has stood among poets and artists from time immemorial as a symbol of sleep.

POPPY

POPULAR SOVEREIGNTY. See SQUATTER SOVEREIGNTY.

POPULA'TION. By *population* of a country is meant the total number of men, women and children that it contains. The greatest asset of a nation is its number of healthy, contented men and women, and its greatest source of future wealth is its boys and girls. Therefore the study of population statistics is of vital interest and importance.

Population of the World. At the beginning of the World War the population of the world was estimated at 1,690,000,000. In the century 1814–1914 it more than doubled, notwithstanding the fact that the birth rate in civilized countries has steadily declined during the last few decades. The causes of this remarkable increase are found in improved sanitation and the rapid advance in medical science, both of which have greatly reduced infant mortality; and in the effect of these improvements and the increase in general knowledge upon adults in lengthening the span of life. Everyone has a better chance to live a longer life.

The following table shows the increase in population in millions of the continents for the century:

YEAR	EUROPE	AMERICA	ASIA	AFRICA	AUSTRALIA
1814	180	21	389	99	3
1914	440	165	908	162	8

About nine-tenths of this population lives within the jurisdiction of the eleven principal states of the world. Previous to the World War these states, with the population in millions, were:

COUNTRY	POPULATION IN MILLIONS
The Chinese Republic	325
British Empire	440
Russia	174
France	80
United States (including insular possessions)	110
German Empire	79
Austria-Hungary	50
Japan	73
Netherlands	44
Ottoman Empire	21
Italy	37

It is estimated that 33,000,000 people lost their lives, directly or indirectly, as a result of the World War. For the half century (1864-1914) the increase in population was greatest in the United States, being 190 per cent. The other countries having a rapid increase were Russia in Europe, 90 per cent; Germany, 62 per cent; England, 59 per cent; Austria, 41 per cent; Hungary, 40 per cent; France, with an increase of only 10 per cent, was far behind the other nations. In 1919 Argentina led the world in the increase in population.

Sex. From enumeration of about one-half the population of the world for the purpose of determining the relative proportion of the sexes, it appears that about 50.3 per cent are male and 49.7 per cent female, Europe, however, forms an exception. On that continent before the World War 50.6 per cent of the population were females and 49.4 per cent males, and the war increased this difference.

Growth of Cities. Another marked change in population during the nineteenth century was the massing of people in cities in all civilized countries. But nowhere is this shown more strongly than in the United States, especially since the completion of its first century as an independent nation. In 1880, 29.5 per cent of the population resided in cities of 2,500 or more inhabitants. In 1910 the urban population had increased to 46.3 per cent. In 1880, 14,772,432 inhabitants resided in cities having a population of 2,500 or more. In 1910 this number had been increased to 42,623,283. See CITY.

Vital Statistics. That branch of statistics which deals with the growth and changes in population is called *vital statistics.* It derives its facts from two sources, the census and registration. Censuses are taken periodically (see CENSUS), and they give the population at a specified date. Registrations include births, deaths and marriages. The results obtained from studying vital statistics are called *rates.* The rate is determined by studying the registration of a definite group of people in a given locality for a given time. The number of people in the group is usually 1,000 and the time one year. The number of deaths in such a group would be the death rate of the group. But usually in determining these rates the entire population of a city or state is considered. Rates obtained from such comparisons are known as *general rates,* as the general death rate and birth rate for the state of Ohio. The accuracy of the rate depends upon the completeness of the registration, and in this respect European countries are far in advance of the United States. See MORTALITY, LAW OF.

Interesting Facts. A study of the death rate of different countries reveals interesting facts. Before the World War the general death rate was highest in Russia, where it was 31.2 per thousand. The sections having the lowest death rate were Australia, Great Britain, Denmark, Norway, Sweden, Holland and some of the states of the United States. The rate is highest during the first year, and after the 80th year. The death rate of male children in England under normal conditions during the first year, for example, is 161. The lowest death rate for each sex is reached in the ages 11 to 13. In general, the death rate among females is lower than among males.

The birth rate is usually high where the death rate is high, though some countries having a high birth rate have a low death rate. The birth rate in America and Australia has decreased since 1880. There are not sufficient data to enable statisticians to determine whether or not the birth rate in the United States is high enough to enable the native

population to maintain itself by excess of births over deaths.

In most countries over one-half the people of marriageable age marry. The highest marriage rates have been in Saxony, Russia, Hungary and Serbia. Definite statistics for the United States and Canada are not obtainable.

POP'ULIST PARTY, or **PEOPLE'S PARTY.** See POLITICAL PARTIES IN THE UNITED STATES.

PORCELAIN, *pawr'se lain,* or *pawrs'lain,* a fine earthenware which differs from ordinary pottery in being whiter and harder and in having a translucent quality. It was first made in China about the third century B. C. and is therefore called *china,* or *chinaware.* The first successful attempt in manufacturing it in Europe was made in the fifteenth century, in Italy. About one hundred years later the manufacture of porcelain was begun in Germany, under the direction of Johann Böttger, whose product—known as Dresden ware—from the place of manufacture, was to gain world-wide popularity. This ware, like the Chinese porcelain, is called *hard* porcelain, and is made of kaolin and feldspar (see DRESDEN CHINA). Much of the porcelain of commerce is made with gypsum, bone ash and other material, and is called *soft* porcelain. It is not so choice as the hard, but it includes many famous varieties—Chantilly, Sèvres and Limoges in France, and Derby, Chelsea and Worcester in England. Porcelain is the ideal material for ordinary table service, and the porcelain industry is among the largest in the world. Although fine porcelain is very costly, cheaper grades, artistic in design and decoration, are within the reach of the moderate purse.

PORCUPINE, *pawr'ku pine,* a large forest rodent, whose distinguishing characteristic is

PORCUPINE

a covering of sharp spines, or quills, intermixed with coarse, stiff hair. It is from two to three feet long, and the tail adds six inches. The quills, the size of goose quills, are often more than a foot long and are sharp-pointed. These quills point backward, but when the animal is excited or angry, the bristles are erected and used for defense; rarely are they raised in offensive attack. When the animal rolls itself up into a ball, with quills pointing in every direction, it is almost invulnerable to attacks of its forest enemies.

Porcupines are divided into two chief groups, the Old World porcupines, which live on the ground and burrow in it; and New World porcupines, which are tree-inhabiting. Of the former group the best known, the common porcupine, is a solitary animal that prowls at night, lives on a vegetable diet and in winter crawls into its burrow and becomes torpid. The North American porcupine is yellowish-white, with some black hairs. The Canadian animals divide their time between evergreen trees and rocky shelters on the ground. The flesh of the young is good to eat.

PORCUPINE, ONT., composed of the four settlements of Porcupine, South Porcupine, Schumacher and Timmins, is 450 miles north of Toronto, on the Temiskaming & Northern Ontario Railway. The town suffered from a disastrous fire in 1911, but was at once rebuilt and greatly improved. It is the center of a great gold-mining camp. Population, about 5,000.

POR'GY, or **POR'GEE,** a fine food fish, common in the Mediterranean Sea and in the Pacific and Atlantic oceans. Of the several American species the most common is the scup of the Atlantic coast. The red porgy of the Gulf of Mexico, about two feet long, is in great demand for the market.

PORK, the flesh of the hog. In the United States pork is more generally used than any other meat. Large quantities are also shipped to European countries. The variety of products is greater than from any other kind of meat. Pork contains more fat than beef or mutton, is not so easily digested and needs to be thoroughly cooked. About 50,000,000 hogs are slaughtered in the United States each year.

Related Articles. Consult the following titles for additional information:

Bacon	Meat
Ham	Meat Packing
Lard	Sausage

PO'ROSITY, the property of possessing pores, characteristic of all matter. Some substances, such as sponge and bread, have

large pores, while others, like iron and gold, have extremely small ones, too small even to be detected by the most powerful of microscopes. The porosity of such dense substances is proved by the fact that water and certain gases may be forced through them by hydrostatic pressure.

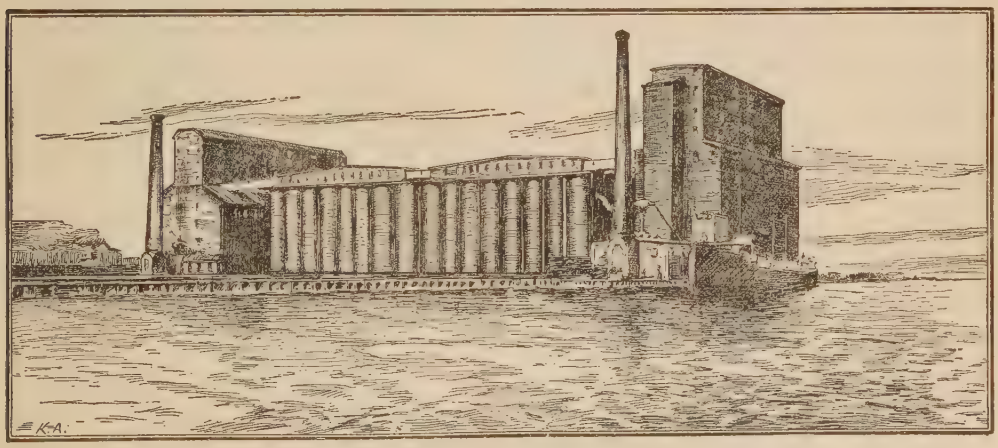
PORPHYRY, *por'fi ry,* a marblelike substance composed of two different kinds of rock. The mass is usually feldspar, through which are distributed large crystals of some other material, giving the whole a speckled appearance. It varies considerable in tone, ranging from very light to dark, and differs, too, in color, green, red, ochre being conspicuous. Like marble, it takes a high polish and is valuable as an ornamental building stone.

PORPOISE, *por'pus,* a marine mammal belonging to the same family as the dolphin. The common porpoise, of frequent occurrence in northern seas, has a spindle-shaped body about seven feet long. The thick skin, dark above, light underneath, is hairless and is underlaid with a layer of fat, which yields a valuable oil. The eyes are small, and between them is a crescent-shaped blowhole by means of which the animal makes a puffing noise. Each jaw is provided with from forty to fifty teeth, and the animal feeds on smaller fishes, chiefly herring and mackerel, sometimes ascending estuaries for its prey. Schools of these animals are not uncommon in North Atlantic waters. See DOLPHIN.

PORTAGE LA PRAIRIE, MAN., situated on the Portage plains, fifty-six miles west of Winnipeg. It is on the Canadian Pacific, the Canadian Northern and the Grand Trunk Pacific railroads and connection with the Great Northern gives it direct communication with Minneapolis, Saint Paul and other American cities. The chief industries include flour and oatmeal mills, brick yards, a sash and door factory, a pump factory, a steel grain-bin plant, and plants for the manufacture of threshing machines. There are seven large elevators.

The city has a number of parks, Island Park, immediately south of the city and nearly surrounded by Crescent Lake, being one of the most beautiful parks in Western Canada. It is the seat of a collegiate institute and a normal school. There is a hospital, a home for incurables, an old folks' home and an armory. Population, 1916, 5,860.

PORT ARTHUR, MANCHURIA, is situated at the extremity of the Liaotung peninsula, on the Strait of Pechili, and at the terminus of one of the branches of the Trans-Siberian Railway. The town has an excellent harbor which has been enlarged and improved. Port Arthur was captured by the Japanese after a memorable siege during the Russo-Japanese War, and it is now an important Japanese naval station. The Japanese also maintain a garrison in a fort here, which before the World War was believed to be impregnable. Port Arthur was formerly an insignificant Chinese fishing village. Later it was converted into a fortified naval station to defend Peking. Its prominence in the Russo-Jananese War gave it worldwide fame. It has a population of about 18,000.



PORT ARTHUR GRAIN ELEVATOR; LARGEST IN THE WORLD

PORT ARTHUR, ONT., the thirty-ninth city in size in the Dominion, in the Thunder

Bay district, at the head of Lake Superior, two and one-half miles from Fort William. The Canadian Northern, Canadian Pacific and Grand Trunk Pacific railways, together with exceptional opportunities for water transportation, make Port Arthur an important collecting and distributing point, especially for the grain-growing regions. The report of the Board of Trade shows a total of over 92,000,000 bushels of grain shipped from Port Arthur and Fort William in average years; the Canadian Northern's great elevator, with a capacity of 7,500,000 bushels, is said to be the largest in the world. There are also large fishing, mining and lumbering interests. A blast furnace, large coal and iron ore docks, a dry dock and shipbuilding plant, cold storage plants, saw mills and foundries are among other large establishments. About 350,000 tons of pig iron are shipped from Port Arthur each year. A public library, an armory, a Y. M. C. A., a sailors' institute and district judicial buildings are features of the city. Population, 1911, 11,220; in 1918, 18,000.

PORT ARTHUR, Tex., a seaport of Jefferson County, on Sabine Lake and the Kansas City Southern and the Texas & New Orleans railroads, twenty miles southeast of Beaumont. It is also on the Intercoastal, the Sabine-Neches and the Port Arthur ship canals, and the largest ocean vessels can reach the city. There are extensive oil fields in the vicinity, and the city is a center for oil refining. There are rice mills, also, for the place is tributary to the greatest rice plantations of the South. There are pleasure resorts, a Federal building, a hospital and a college. The city is governed on the commission plan. Population, 1910, 7,663; in 1917, about 16,000.

PORT-AU-PRINCE, *por to praNs'*, the capital and chief city of the republic of Haiti, is situated on the west coast of the island, at the southeast extremity of the Bay of Gonaives. It is built on low, marshy ground and is unhealthful. The city is well laid out with broad, regular streets, but the buildings are of wood and are poor, and many of them are in a neglected condition. The most important structures are a palace, the senate house, a cathedral, a customhouse, a mint, a hospital and a college. It has a United States consul. The inhabitants are chiefly mulattoes and negroes, who are very ignorant and lazy. They speak an imperfect French dialect. The chief exports are coffee, cocoanuts and cabinet woods. Population, 1914, about 100,000.

PORTE, The Sublime. See Constantinople.

PORT ELIZ'ABETH, a seaport of the province of Cape of Good Hope, Africa, is at the west end of Algoa Bay, about 435 miles east of Cape Town and about 380 miles southwest of Durban. Its harbor is protected by jetties, and the city has such an exclusive trade that it is called the "Liverpool of South Africa." It ranks next to Cape Town, the capital, in population. The important buildings include a town hall, a postoffice, courthouse, library and the Feather Market, where an annual sale of ostrich feathers is held. Population, about 31,000, of which 18,200 are whites.

PORTER, David (1780-1843), an American naval officer, born at Boston. He early went to sea and was twice impressed by the British, but escaped. In 1798 he entered the United States navy as midshipman, and served on the *Constellation* in the famous battle with the *Insurgent*. During the war with Tripoli, in 1803, he was captured when his ship, the *Philadelphia*, grounded in Barbary waters. As captain and commander of the *Essex* in the War of 1812, he captured many British vessels. At Valparaiso the English ships *Cherub* and *Phoebe* violated the neutrality of the port and forced him to unequal combat, and he surrendered. At the close of the war he was made commodore and commanded expeditions against the West Indian pirates. For compelling the Spanish authorities at Porto Rico to apologize for an insult to his flag, thus exceeding his authority, he was suspended for six months. This so incensed Porter that he resigned and joined the Mexican navy, remaining in it until 1829. Thereafter he served the United States as consul-general to the Barbary powers and as *chargé d'affaires* at Constantinople. He was father of Admiral David Dixon Porter and, by adoption, of David Glasgow Farragut.

DAVID PORTER

PORTER, David Dixon (1813-1891), an American admiral, son of Commodore David

Porter. He was born at Chester, Pa. In his youth he served in the Mexican navy, entered the United States navy as midshipman in 1829, and as lieutenant served with distinction in the Mexican War. At the beginning of the Civil War he was placed in command of the steam frigate *Powhatan,* and his services soon won for him the rank of commander. In command of a mortar fleet he rendered assistance to Farragut by reducing forts Jackson and Saint Philip and aided the army in the capture of Arkansas Post. His able coöperation with Grant in the siege of Vicksburg gained him a commission as rear admiral. In 1865, while in command of the North Atlantic blockading squadron, he, with General Terry, captured Fort Fisher. After the war he served efficiently four years as superintendent of the Naval Academy at Annapolis. In 1866 he became vice-admiral, and on the death of Farragut, in 1870, rose to the highest naval rank, that of admiral.

DAVID D. PORTER

PORTER, Jane (1776–1850), an English novelist. Her most important novels were *Thaddeus of Warsaw* and *Scottish Chiefs,* the latter the best historical romance written up to the time of Scott.

PORTER, William Sidney (1867-1910), one of the most popular of American short-story writers, universally known to the reading public as "O. Henry." He was distinctly American. His broad sympathy and keen understanding of the lives of the poor and outcasts, his picturesque descriptions and characterizations, especially of New York types, have won for him an enviable following.

He was born in Greensboro, N. C. Before beginning his literary career as a reporter on the Houston (Tex.) *Post,* he "knocked around" the South and Southwest, gathering local color which later flavored his "O. Henry" tales. Later he was buffeted among life's flotsam and jetsam in a trip to Central America. Upon his return to the United States he became involved in a bank embezzlement at Greensboro, for which he served a jail sentence, although his innocence was subsequently proven. During his incarceration he wrote a number of his most famous short stories. He finally settled in New York, where he died. His best known collections include *The Trimmed Lamp, Sixes and Sevens, The Voice of the City* and *Cabbages and Kings.* An edition of his collected *Works* also has been published. Many of the "O. Henry" tales have been successfully dramatized for the moving picture stage. In 1919 a great hotel in his native city was named the O. Henry Hotel, and the second floor was set aside as a memorial to him.

PORT HOPE, Ont., in Durham county, on Lake Ontario, the Ganeraska River, and the Grand Trunk, Canadian Northern and Canadian Pacific railroads. It has a fine harbor and trade in lumber, grain and dairy products. There are manufactories of woolen goods, flour, steel, porcelain and enamel ware, leather belting, plows, etc. The canning of fruits and vegetables is also important. It is the seat of Trinity College School, in affiliation with Trinity University, Toronto. Population, 1911, 5,092.

PORT HU'RON, Mich., eleventh city in size in the state and the county seat of Saint Clair County, sixty miles northeast of Detroit, on Lake Huron, at the head of the Saint Clair River and at the mouth of the Black River, and on the Pere Marquette, the Port Huron Southern and two lines of the Grand Trunk railroad. An interurban line runs to Detroit. The city is built on both sides of the Black River, and there is a railroad tunnel under the Saint Clair River to Sarnia, Canada. Port Huron has connection by boat with the other ports on the Great Lakes and conducts a large trade. There are several dry docks and shipbuilding yards, engine and thresher works, railroad shops, foundries and other factories.

The climate, scenery, mineral springs and fishing facilities have made the place a popular summer resort. It has a Carnegie Library, a normal school, Saint Stephen's Academy, a law library, a business college, four banks, a hospital and four public parks. Other prominent structures are a Federal building, a city hall, a courthouse, Maccabee Temple and a large convention hall. The place was settled by a French colony in 1790, and was known by various names until its organization as the village of Port Huron in 1849; it was chartered as a city in 1857. Population, 1910, 18,863; in 1918, practically unchanged.

PORTLAND, ME., the state's largest city and the county seat of Cumberland County, sixty-three miles nearly south of Augusta, on Casco Bay and on the Maine Central, the Boston & Maine and the Grand Trunk railroads. The streets are regularly laid out, and there are about 115 acres of parks, containing a soldiers' monument and a fine bronze statue of Longfellow, whose birthplace was here.

The city has a public library and that of the Maine Historical Society, a medical college, public kindergarten and manual training schools, Westbrook Seminary and parochial schools. The charitable institutions include the Maine General Hospital, Maine Eye and Ear Infirmary, the United States Marine Hospital and homes for orphans and for aged men and aged women. Other prominent buildings are a city hall, an armory, a customhouse, a postoffice, Cathedral of the Immaculate Conception, Saint Luke's Cathedral, Union Depot, Mechanics' Hall, several large hotels, an exposition building seating 4,500 and a large county building. In the city hall is a $60,000 organ, the gift to the city of Cyrus H. K. Curtis, the Philadelphia publisher, who was born here. A municipal organist is maintained, at a salary of $5,000 per year; there is a good income from concerts and recitals.

Portland has a deep harbor and has been an important trading center since colonial times. It has an extensive coastwise trade, and several foreign steamship lines make connection here. The port has large warehouses and grain elevators and is a very important shipping port for Canada. The industrial establishments of Portland include locomotives and car works, rolling mills, hat factories, boot and shoe shops, tanneries, foundries, machine shops and other factories.

The place was settled in 1632 and was known by the Indian name of Machigonne. It was then successively called Stogomer, Casco Neck and Falmouth. In 1676 the village was destroyed by Indians, and after other settlers had come the place was again ravaged in 1690. In 1715 a settlement was made which proved permanent. It was incorporated as the town of Portland in 1786, and was chartered as a city in 1832. Population, 1900, 50,145; in 1910, 58,571; in 1917, 64,720 (Federal estimate).

PORTLAND, ORE., the metropolis of the state, the twenty-first city in population in the United States, and the county seat of Multnomah County, is situated about 100 miles from the Pacific Ocean and twelve miles south of the junction of Columbia and Willamette rivers. It is on both banks of the latter river, and is visited by ocean steamers from American ports on the Pacific and by liners from the Orient. Salem, the state capital, is fifteen miles south, and San Francisco is 771 miles southwest. The city, a prosperous industrial and commercial center, is served by the Great Northern, the Northern Pacific, the Southern Pacific, the Canadian Pacific, the Chicago, Milwaukee & Saint Paul and other railroads.

General Description. Portland has a delightful situation in the forest region of Northwestern Oregon. Great firs, oaks and cedars clothe the surrounding hills and grow close to the borders of the city, which is rendered attractive by profuse growths of shade trees, beautiful lawns and a wealth of flowers and shrubbery. Especially beautiful are the roses of Portland, and no other city so well deserves the name "Rose City." At the head of the main business street is Washington Park, an enclosure of forty acres, containing elevations from which may be obtained splendid views of the waterfalls, canyons, forests and snow-capped peaks of the surrounding country. Many other parks contribute to the attractiveness of the city, notable among which are Mount Tabor, Columbia and Peninsula. The latter is widely known for its beautiful sunken gardens and its many varieties of roses. The city is the terminus of the great Columbia River Highway, which winds its way through a region famed for the grandeur of its scenery (see COLUMBIA RIVER HIGHWAY).

Buildings and Institutions. Portland has handsome, modern business and public buildings, including the fifteen-story Northwestern National Bank, a $600,000 Federal building; a courthouse, erected in 1912 at a cost of $1,500,000, and a public auditorium costing $600,000. The public library, which is maintained by a county tax, is housed in a modern structure erected in 1914. Prominent educational institutions include Reed College, the medical school of the University of Oregon, Columbia University, professional colleges and preparatory schools. The Good Samaritan and Saint Vincent's hospitals are the best known of more than fifteen public and private hospitals.

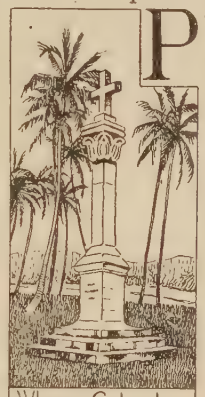
Commerce and Industry. Portland harbor, which has modern docks, accommodates ocean vessels drawing thirty feet of water. There is a thriving export trade in grain, flour, lumber, fish and canned goods, and the city is also a great jobbing and wholesale center for a rich agricultural and lumber district. It is one of the leading lumber ports in the world, and the second largest city in the United States in wheat export, being surpassed only by New York City. The chief manufacturing industries consist of the making of lumber, machinery, woolen goods, flour, fur garments, furniture, paints, oils and soap. There are numerous plants of minor importance. The extent and rapid development of these industries have made Portland one of the wealthiest cities of its size in the United States. Twelve miles to the southeast are the Willamette Falls, which furnish water power ample for all industrial enterprises.

History. Portland was founded in 1843 by settlers from New England, and named for Portland, Maine. A city charter was granted in 1851, and the place entered upon a period of steady growth and prosperity. A fire in 1873 and floods in 1894 caused great damage but failed to check the development of the city. In 1905 it was the scene of the Lewis and Clark Exposition. Portland adopted the commission form of government in 1913. In June, each year, a rose festival is held. Population, 1910, 207,214; in 1917, 308,399 (Federal estimate).

PORTO ALEGRE, *pawr'toh ah la'gr'*, Brazil, capital of the state of Rio Grande do Sul, one of the most progressive cities of the republic. It is situated at almost the extreme southwestern extremity of the country, on a lagoon whose shifting sands interfere with ocean navigation. There is a normal school, a school of engineering and a theological seminary. There are coal mines near the city; these are not sufficient, however, to supply local needs. Population, 1917, about 120,000.

PORT OF ENTRY, any point at which a government allows foreign goods to be unloaded and released to domestic trade. At each of such ports there is a customhouse through which all imported goods must pass; and anyone who attempts to smuggle dutiable merchandise into a country through other channels is guilty of fraud and liable to fine and imprisonment. Formerly all ports of entry were seaports or towns on the boundaries of countries, but since shipping in bond has become customary, any inland city may be the customs administration be designated a port of entry.

PORT OF SPAIN, Trinidad, capital city of that British West Indian island and a port from which much of Northern South America's products are shipped. It is particularly important as a shipping point for asphalt. It is one of the best towns in the entire West Indies. Population, 1916, about 60,000.


Where Columbus landed in Porto Rico

PORTO RICO, a possession of the United States and one of the most beautiful of the West Indies, is 1,000 miles east by south of Key West, and 1,500 miles southeast of New York. The island is nearly rectangular in outline, is about 100 miles long and averages a little over thirty miles in width. Its area, including a number of small islands along the coast, is 3,606 square miles, or about three-fourths that of Connecticut, and nearly three times that of Rhode Island, the smallest state in the Union.

The People. Spaniards and other whites constitute about two-thirds of the inhabitants; the remainder are negroes and people of mixed negro and Spanish blood, descendants of the negroes who were brought to the island as slaves. The majority of the whites are Spaniards, but since the island became a possession of the United States, many American business men have acquired interests there. In 1910 the population was 1,118,012; in 1916 the United States government estimated it at 1,216,000. Nearly all the inhabitants are Roman Catholics.

There are no large cities. San Juan, the capital, with a population of about 49,000, is the largest. Ponce, the city next in size, has 35,000. Mayaguez with 16,600, and Caguas with 10,400, are the only other cities having populations exceeding 10,000.

Surface and Drainage. A range of low mountains or hills extends across the island in an east and west direction. These have an altitude of from 2,000 to 3,000 feet, and the highest peak, in the northeastern part of the island, reaches 3,609 feet. From this

range of hills the land slopes north and south. Along the coast are stretches of nearly level low land, but the interior of the island is elevated and hilly.

The rivers are all short and rapid. While a few of them have estuaries which serve as harbors, none of them is navigable for any distance, though all are more or less valuable for water power. Those of importance flowing to the north coast are the Bayamon, the Loiza, the La Plata, the Manati and the Tanama. The Blanco flows to the western coast, and the Guayanes is the most important stream flowing to the south. There are numerous lagoons along the coast, and there are a few small lakes in the interior.

Climate. Porto Rico is within the region of the northeast trade winds, which modify its temperature so that it does not suffer from the intense heat of some regions within the same latitude. The climate of the high land in the interior is also more salubrious than that along the coasts. The thermometer seldom rises above 100° in the hottest months or falls below 50° in the coldest. The mean annual temperature at San Juan is about 80°. The rainfall varies, averaging 60 inches at San Juan and 100 inches or more on the northeast coast. The north side of the island, because of the prevailing winds, receives more rain than the south England, Spain, South America, and other West India ports. The commerce is largely with the United States.

Mineral Resources. The island has an abundance of clay suitable for making brick and tile. An excellent quality of limestone occurs in large quantities, and it is generally used in the construction of public buildings and the residences of the more wealthy inhabitants. Boulders are also used to some extent in the construction of dwellings. An excellent quality of marble is found, and there are large deposits of gypsum, which is used in stucco work and as fertilizer. On the south coast are extensive deposits of phosphates, and a considerable phosphate industry has been developed on Mona Island. Near Ponce are a number of caves filled with deposits of guano. Enough salt for home consumption is obtained from deposits at Coamo, Guanica and Sierra de Pinones de Cabo Rojo. Some lignite is found, and since the discovery of the island by Columbus, gold in small quantities has been washed from the beds of streams. Ores of copper and iron of good quality are found, but no mining of metals on a large scale has yet been attempted.

Agriculture. Agriculture is the great basic industry of Porto Rico and constitutes the source of livelihood of more than four-fifths of its people. The diversity and general upbuilding of agriculture is the fundamental economic task of both the people and the government of the island.

Sugar, coffee and tobacco are the leading crops in quantity and in value. These are followed by fruit and nuts. Bananas, pineapples, plantains, oranges, grapefruit, cocoanuts, and beans are among the leading exports.

Practically all the tillable land is under cultivation. According to the United States Census Bureau, out of an area of 2,198,400 acres over 2,085,162 are in farm lands, and 1,570,304 acres are in improved land. The farms are small, having an average size of 35.7 acres. Previous to the occupation of the island by the United States, the most primitive methods and antiquated implements were employed. But an agricultural commission has been organized, and the United States Department of Agriculture is also giving the farmers of Porto Rico the benefit of its wide experience and exhaustless resources. Under these influences rapid progress is being made.

Manufactures. The manufactures are directly connected with agriculture. In order of their importance they are the manufacture of sugar, molasses, cigars and cigarettes, and the cleansing and polishing of coffee. Minor manufactures include the making of hats and straw goods, and the manufacture of boots and shoes. Machine shops and carpenter shops confine their work chiefly to making repairs. San Juan and Ponce are the centers of the tobacco industry. Manufacturing industries are being introduced and supported by American business men, as rapidly as the business conditions of the island seem to warrant.

Transportation and Communication. There are over 1,000 miles of macadamized roads in the island, and the country roads are being rapidly improved. Funds for these roads are derived from an annual government appropriation. There are about 300 miles of railway in operation. This is a portion of a belt line which is projected to encircle the island; the line already completed has numerous branches extending to industrial centers, and others are being projected. There are electric cars in San Juan and Ponce. The residents of the larger cities and towns are favored with complete telephone systems, and there is telegraph communication throughout the island. The railway mail and postoffice service is controlled by the Postoffice Department of the United States. Regular lines of steamers communicate with United States cities.

Government. In 1917 Congress passed an act giving Porto Ricans full rights as citizens of the United States, though such citizenship is not obligatory. The governor is appointed by the President of the United States. There are departments of justice, finance, interior, education, agriculture, and labor and health, and the heads of these departments constitute the governor's council. The attorney-general and commissioner of education are appointed by the President, and the heads of the other departments by the governor, with the advice and consent of the senate of Porto Rico.

The legislature consists of a senate of nineteen members and a house of representatives of thirty-nine members, all elected by the qualified voters for a term of four years. The island is divided into seven senatorial districts. Two senators are chosen from each district and five are senators-at-large. The legislature elects a delegate to the United States Congress. All laws passed by the legislature are subject to the approval of Congress and the President. In July, 1917, the Porto Ricans by a majority of over two to one adopted prohibition.

Education. A system of elementary schools on the American plan was organized immediately after the United States took possession of the island, and education was made compulsory. Since that time remarkable progress has been made. In 1917 special attention was given to raising the standard of qualifications for teachers, to grading the pupils and making the course of study more practical. There are over 4,300 elementary schools in the island. They are taught by native teachers, more than half of whom are women. The University of Porto Rico, near San Juan, has normal courses, and many native teachers obtain their preparation there. The institution has about 1,000 students. In San Juan a Carnegie Library costing $100,000 has been erected.

History. Porto Rico was visited by Columbus on his second voyage in 1493 and was named San Juan Bautista. In 1508 Ponce de Leon landed on the island, and two years later he began its conquest. The Spaniards soon subdued and enslaved the natives, and within the next few decades, under their rigorous rule, most of the natives died. Negroes were then imported for slaves. With the exception of a few decades during European wars, the island remained in peaceful possession of Spain, but its development was slow, owing to the colonial policy of that country. Several minor attempts at revolt were made, and one of these in 1867 caused some anxiety, but was speedily suppressed.

Two years later Porto Rico was made a province of Spain and allowed representation in the national parliament. After eleven years, however, this favor was withdrawn. During the Spanish-American War the island was occupied by the United States forces under Admiral Sampson and General Miles on July 20, 1898. At the Treaty of Paris, Porto Rico was surrendered to the United States. In consideration of the surrender of Porto Rico and the Philippines to the United States the later country paid Spair $20,000,000.

PORT SAID, *sah eed'*, EGYPT, is situated at the Mediterranean entrance of the Suez Canal. It has a large, deep harbor, which is well protected by piers and by a breakwater. The importance of the town rests in the fact that it is at the entrance of the canal, and because of this it has considerable shipping business. At the entrance of the harbor is a statue of Ferdinand De Lesseps, the engineer of the canal, a lighthouse and extensive docks. Population, 1911, 34,400. See SUEZ CANAL.

PORTSMOUTH, *ports'muth*, ENGLAND, the chief naval station of Great Britain, situated at the southwest extremity of Portsea Island, seventy-four miles southwest of London and eighteen miles southeast of Southampton. The harbor is four miles long and nearly as wide and is large enough to accommodate the entire British navy. The town and harbor are protected by extensive fortifications, considered the best in Great Britain. The buildings and industries are comparatively unimportant. The city was the birthplace of Charles Dickens, George Meredith and Walter Besant. Population, 1911, 231,141.

PORTSMOUTH, N. H., one of the county seats of Rockingham County (Exeter being the other), fifty-seven miles nearly north of Boston, on the Boston & Maine railroad and an interurban line, and on the navigable Piscataqua River, three miles from the Atlantic Ocean. It is the only seaport in the state and has a large, deep harbor and a considerable coasting trade. The industrial establishments include a large shoe factory, marble works and manufactures of shoe buttons, button-sewing machines, locks and other goods. It has the largest button factory in the world.

Portsmouth is of historic interest and still contains several colonial mansions. The Isles of Shoals and many other places in the vicinity are popular summer resorts. The Portsmouth navy yard is on an island formerly known as Fernald's Island, now within the limits of the township of Kittery, Maine. The city has three parks, a public library and the Athenaeum, containing a museum and a large library, and a Federal building. Other buildings of note are the old residences of governors Wentworth and Langdon, the Saint John's Church and the Federal building.

The place was settled in 1623 and was known for many years as Strawberry Bank. It was incorporated as Portsmouth in 1653, and was chartered as a city in 1849. After the organization of New Hampshire, in 1679, it was the capital of the state until 1807. The United States District Court of New Hampshire now holds its sessions alternately at Concord and Portsmouth. In the summer of 1905 the treaty which closed the Russo-Japanese War was negotiated here. Population, 1910, 11,269; in 1917, 11,730 (Federal estimate).

PORTSMOUTH, OHIO, the county seat of Scioto County, 100 miles south of Columbus, on the Ohio River, at the mouth of the Scioto and at the terminus of the Ohio Canal, and on the Baltimore & Ohio Southwestern, the Norfolk & Western and the Chesapeake & Ohio railroads and an interurban line. There are also several steamship lines on the river. The city is in a fertile agricultural region, with considerable mineral wealth, and it has become an important industrial center. It contains a Carnegie Library, a hospital, a Masonic Temple and several charitable homes. There are three parks. The Scioto valley contains interesting remains of the Mound Builders. The various manufactures include steel, shoes, brick, cars, furniture, veneering, foundry and machine shop products, and paper boxes. Population 1910, 23,481; in 1917, 29,356 (Federal estimate).

PORTSMOUTH, VA., the county seat of Norfolk County, on the Elizabeth River, opposite Norfolk, with which it is connected by a ferry. It is on the Seaboard Air Line, the Chesapeake & Ohio, the New York, Philadelphia & Norfolk and the Southern railroads, while roads entering Norfolk also maintain connections here. The city is a popular residence place for Norfolk business men. It contains a United States navy yard, a naval hospital and a city park. In 1919 the largest drydock in the United States was opened at the navy yard; its length is 1,022 feet, it has

a depth of over forty feet, and cost $4,000,000. There are also other drydocks. There are also extensive steel shipbuilding yards, hosiery factories, smelting works, cotton mills and railroad shops. The city has a naval training station, a naval magazine and a naval hospital. There is a large trade in lumber, cotton, naval stores, fruits and vegetables. The place was settled in 1752 and was chartered as a city in 1858. The Trinity Episcopal Church was first built in 1762 and is of historic interest. On the present site of the navy yard, the British government operated shipyards before the Revolution. Population, 1910, 33,190; in 1917, 40,693 (Federal estimate).

PORTUGAL, a republic of Europe, occupying the extreme southwestern part of the continent, is bounded on the north and east by Spain and on the west and south by the Atlantic Ocean. Its greatest length from north to south is 350 miles, and its average width is 100 miles. With the Azores and Madeira islands, which are usually considered a part of the republic, the area is 35,400 square miles, or a little more than that of Indiana.

The People. Portugal was originally colonized by Phoenicians, Carthaginians, Greeks and Romans, and later by Gothic and Moorish invaders. All these were the ancestors of the Portuguese, who are short of stature and have dark hair and eyes. While resembling the Spaniards in outward appearance, the Portuguese differ from them in temperament. They lack the artistic and aesthetic temperament of the other nations of Southern Europe, and are much more serious and sober-minded than the Spaniards. Although they dress in gay clothing, the Portuguese are a busy and industrious people. The women perform much of the heavy labor, and carry heavy burdens on their heads. Many French, English and Dutch have come into the country from the colonies, but emigration is far in excess of immigration. The population in 1911 was 5,958,000.

The Portuguese language closely resembles the Spanish, differing from it chiefly in accent and pronunciation. Cervantes characterized Portuguese as "Castilian without bones." Previous to the formation of the republic in 1910 Roman Catholicism was the religion of the state, but the Church and state were separated under the new government, and there is no state religion. There are about 5,000,000 Roman Catholics and 40,000 adherents of other creeds in the country.

Surface and Drainage. Portugal is only partially separated from Spain by natural boundaries. Its shape is nearly that of a parallelogram. The coast line, of great length in proportion to the extent of the whole surface, runs in a general south-southwest direction till it reaches Cape Saint Vincent, where it suddenly turns east. The coast is occasionally bold and rises to a great height; but the far greater part is low and marshy, and is not infrequently lined by sands and reefs, which make navigation dangerous. The interior is generally mountainous, a number of ranges stretching across the country, forming a succession of independent river basins, while their ramifications form the watersheds of numerous tributary streams and enclose many beautiful valleys. The loftiest range is the Serra da Estrella, a continuation of the central chain stretching across Spain, which attains the height of 7,524 feet.

Climate. The climate of Portugal is temperate and equable, the mean yearly temperature being 61°, with a difference of only 20° during the year. The country was formerly a popular winter resort, but lack of improvements and sanitation caused tourists to seek more favorable localities in Southern France and Italy. The equable temperature is due largely to the influence of the sea and to the heavy rainfall, which is quite evenly distributed throughout the year, although more rain falls in November, December and January than in other months.

Agriculture. The mild and equable climate adapts the country to agriculture, and almost any crop common to central and southern Europe can be grown successfully. Fruits are grown throughout the country, but the warmer districts in the south are noted for the production of oranges, lemons and olives. The mulberry is also cultivated on a large scale, but the cultivation of grapes and the manufacture of wines is the most important branch of the fruit industry. Notwithstanding the natural advantages, agri-

culture is in a deplorable condition, and in ordinary years the country fails to raise enough cereals to meet the demands of the population. Wheat, barley, oats, flax and hemp are cultivated on the higher land, while rice is grown on the lowlands. The raising of live stock is an important branch of agriculture, and a considerable number of horses, cattle, goats and swine are exported. The culture of the silkworm is also important.

Manufactures. The manufactures are comparatively unimportant. The leading centers are Oporto and Lisbon. The most important industries include shipbuilding and the manufacture of cotton and woolen goods, linen, silk, leather, spirits, porcelain, tobacco, hats, ironware, shoes and soap.

Transportation and Commerce. The large rivers are navigable and these form the chief highways to the ocean. They are dotted with bright-hued sails of many small boats, in which the products of the farms are shipped to the large trade centers. The country has over 1,500 miles of railways, which connect all the large cities and towns of Portugal and also with the chief commercial centers in Spain. There are a number of good harbors, the most important being those of Lisbon, Oporto and Setubal.

The exports consist of wine, cork, copper ore, olive oil, fruits and live stock, while the imports include coal, raw cotton, fish and manufactured articles such as cannot be readily produced in the country. The foreign trade is chiefly with Great Britain, Germany, Brazil and the United States.

Literature. Portuguese literature began with the songs of the troubadours (which see), which celebrated the victories over the Moors and barbarians. It reached its height in the sixteenth century in the writings of Camoes. His epic *Os Lusiadas* is considered the greatest poem in Portuguese literature. The writings of the twelfth and thirteenth centuries were mostly on theological subjects, and were in Latin. The fourteenth and fifteenth centuries contained little of permanent value. In the nineteenth century Almeida Garrett, the poet, and Herculano, the historian, were the most influential writers, with possibly the exception of Guerra Junqueiro, the modern poet of Portugal, whose poems are thought by some to be the chief influence leading to the overthrow of the monarchy.

Education. Primary education is compulsory, and since the decree of the provisional government in 1911 the law has been rigorously enforced. There are over 5,500 elementary schools and thirty-one secondary schools, whose teachers are trained in the normal departments attached to the universities at Lisbon and Coimbra. These universities and that at Oporto offer courses similar to those of other European universities. There is a technical school at Lisbon. Colleges for music are located at Lisbon and Oporto, and there is a military and a naval academy at Lisbon. Previous to the overthrow of the monarchy in 1910, education was in a backward state, and, notwithstanding the efforts now being made to educate the rising generation, the percentage of illiteracy is large.

Government. Portugal has been an independent state since the twelfth century. In October, 1910, a republic was declared. A provisional government was organized which continued until the adoption of a new constitution in August, 1911. The Parliament consists of two chambers. The first, called the National Council, consists of 164 members, elected by direct suffrage for three years; the second, or Upper Chamber, consists of seventy-one members, elected by all the municipal councils for six years. The terms of one-half of the members of this chamber expire every three years. The President of the republic is the executive officer. He is elected by both houses of Parliament for four years, and is assisted by a Cabinet of eleven Ministers, all of whom are appointed by himself, but they are responsible to Parliament.

Colonies. The foreign possessions of Portugal, situated in Africa and Asia, are as follows:

Colonial Possessions	Area in English Sq. Mi.	Estimated Population
In Africa:		
Cape Verde Islands	1,480	147,424
Guinea	13,940	820,000
Princes' and Saint Thomas's Islands	360	42,103
Angola	484,800	4,119,000
East Africa	293,400	3,120,000
In Asia:		
In India: Goa	1,469	475,513
Damao, Diu	169	56,285
Indian Archipelago	7,330	300,000
China: Macao, etc	4	63,991
Total	802,952	9,144,310

Cities. The chief cities are Lisbon, the capital; Oporto, Setubal, Faro, Figueira and Vianna.

History. The earliest colonies in Portugal were founded by the Phoenicians and

Carthaginians. These were followed by the Greeks, who settled at the mouth of the Tagus. Later Latin settlements were made, and the sway of the Roman empire was extended over the country. In the fifth century, the entire peninsula was overrun by the Visigoths, and in the eighth century it was conquered by the Moors. The rule of the Moorish Caliphs was wise and for two centuries the country prospered. As the final result of the prolonged struggle between the Moors and the Christians for control of the country, Ferdinand the Great conquered the Moors, and his son, Alfonso IV of Spain, in 1095 made Henry of Burgundy the first count of Portugal. At this date the history of Portugal begins.

The count, who owed feudal services to the Castilian kings, was permitted to hold in his own right whatever conquests he should make from the Moors beyond the Tagus. Henry's son, Alfonso I (1128–1185), defeated the king of Castile and made himself independent, gained the brilliant victory of Ourique over the Moors and was saluted on the field as king of Portugal. The Cortes confirmed him in the royal title, and in 1181 gave to the kingdom a code of laws and a constitution. The succeeding reigns from Sancho I (1185–1211) to Denis, (1279–1325) are noteworthy chiefly for the conflict with the pope, who several times put the kingdom under interdict. Denis's wise encouragement of commerce, agriculture, manufactures and navigation laid the foundation of the future greatness of Portugal.

Denis was succeeded by Alfonso IV, who in turn was succeeded by his son Pedro. Dying in 1367, Pedro I was succeeded by Ferdinand, on whose death in 1383 the male line of the Burgundian princes became extinct. John I, the natural son of Pedro, was saluted king by the estates, and he proved an excellent sovereign. In 1415 he took Ceuta, on the African coast, and this was the first of a series of enterprises which resulted in those great expeditions of discovery on which the renown of Portugal rests. The reigns of his son Edward (1433–1438) and his grandson Alfonso V (1438-1481) were less brilliant than that of John I; but the latter was almost surpassed by that of John II (1481-1495), perhaps the ablest of Portugal's rulers. In his reign began a violent struggle with the nobility, whose power had become very great under his indulgent predecessors. The expeditions of discovery were continued; Bartholomew Diaz doubled the Cape of Good Hope, Vasco da Gama reached India, and Brazil was taken possession of for Portugal by Cabral.

While these great events were still in progress, John II was succeeded by his cousin Emmanuel (1495-1521), under whom the power of Portugal reached its height. In the reign of John III, son of Emmanuel (1521-1557), Indian discoveries and commerce were still further extended; but the rapid accumulation of wealth, through the importation of the precious metals and the monopoly of the commerce between Europe and India, proved disadvantageous to home industry. The wisdom which had hitherto so largely guided the counsels of the kings of Portugal now seemed to forsake them. The Inquisition was introduced, and the Jews, who were among the wealthiest and most industrious citizens of the country, were driven out. Sebastian, the grandson of John III, lost his life in a battle against the Moors and left his throne to the disputes of rival candidates, of whom the most powerful, Philip II of Spain, obtained possession of the kingdom by the victory of Alcantara. The Spanish yoke was grievous to the Portuguese, and many efforts were made to throw it off; but the power of Philip was too great to be shaken. In 1640, by a successful revolt of the nobles, Portugal recovered her independence, and John IV, duke of Braganza, reigned till 1656, when he was succeeded by Alfonso VI. Pedro II, who deposed Alfonso VI, concluded a treaty with Spain (1668), by which the independence of the country was acknowledged.

During the long reign of John V (1706-1750) some vigor was exerted in regard to foreign relations, while under his son and successor, Joseph I (1750–1777), the Marquis of Pombal, a vigorous reformer such as Portugal required, administered the government. On the accession of Maria, eldest daughter of Joseph, in 1777, the power was in the hands of an ignorant nobility and a not less ignorant clergy. In 1792, on account of the sickness of the queen, John, the crown prince, was declared regent. His connection with England involved him in war with Napoleon; Portugal was occupied by a French force under Junot, and the royal family fled to Brazil.

In 1808 a British force was landed under Wellington, and after some hard fighting the decisive Battle of Vimeira took place, which

was followed by the Convention of Cintra and the evacuation of the country by the French (see PENINSULAR WAR). The French soon returned, however; but the operations of Wellington, and in particular the strength of his position within the lines of Torres Vedras, forced them to retire. The Portuguese now took an active part in the war for Spanish independence. On the death of Maria in 1816, John VI ascended the throne of Portugal and Brazil, in which latter country he still continued to reside. The absence of the court was viewed with disfavor by the nation, and the general feeling required some fundamental changes in the government. A revolution in favor of constitutional government was effected without bloodshed in 1820, and the king was invited to return home, which he now did. In 1822 Brazil threw off the yoke of Portugal, and proclaimed Dom Pedro, son of John VI, emperor. On the death of John, the Brazilian emperor Pedro became king of Portugal, and he granted a new constitution, modeled on the French, in 1826. In this year he abdicated the Portuguese throne in favor of his daughter Maria da Gloria, imposing on her the condition of marrying her uncle Dom Miguel, who was intrusted with the government as regent; but the absolutist party in Portugal set up the claim of Dom Miguel to an unlimited sovereignty, and a revolution in his favor placed him on the throne. In 1831 Dom Pedro resigned the Brazilian crown, and returning to Europe he succeeded in overthrowing Dom Miguel and restoring the crown to Maria, but died himself in 1834. In 1836 a successful revolution took place in favor of the restoration of the constitution of 1820, and in 1842 another in favor of that of 1826. Maria died in 1853. Her husband, Ferdinand of Coburg, became regent for his son, Pedro V, who began to reign in 1855. Pedro died in 1861 and was succeeded by his son, Carlos I, who, with the crown prince, was assassinated February 1, 1908. The second son, Manuel II, reigned until 1910, when he was deposed and a republic established.

Upon the overthrow of the monarchy, Manuel II went to England, where he has since made his home. But there was left in the country a strong monarchist party, and this party has harassed the new government ever since its formation.

Antagonism between the Ministry and the army led to a Cabinet crisis in 1915, which caused the resignation of the existing Cabinet and the formation of a new government. This government decided to postpone the general election until the census could be revised. This decision was followed by a revolution, and an attempt to establish the republic of Northern Portugal. The revolution spread rapidly and resulted in the resignation of President Arriaga and the election of Theophilo Braga, President of the provisional government in 1910, for the remainder of his term. At the regular election in August, Bernardino Machado was chosen President.

A military revolution occurred in 1916, led by those who did not believe the government was fulfilling Portugal's treaty obligations with Great Britain relating to the World War. Another revolution in December 1917 overthrew the Machado government, and made Dr. Sidonia Paes provisional President. On December 14, 1918, Dr. Paes was shot and killed by an assassin, and Admiral Canto y Castro was chosen to succeed him.

Portugal in the World War. In accordance with a treaty with Great Britain, Portugal was bound to furnish 10,000 troops for war whenever called upon. In 1914 a Portuguese army attacked the German troops in Africa to protect the Portuguese colonies there. In 1916 the government confiscated forty-four German merchant ships which had been interned in Portuguese harbors. Germany demanded a release of the ships, but Portugal gave no heed to the demand, and on March 8 Germany declared war on the republic, making Portugal the thirteenth nation to enter the conflict.

Related Articles. Consult the following titles for additional information:
Angola
Lisbon
Oporto
Portuguese East Africa
Portuguese Guinea
World War

PORTUGUESE, *por'tu geez,* **EAST AFRICA,** or **MOZAMBIQUE,** *mo zam beek',* a Portuguese colony extending along the coast in the southeastern part of Africa, between what was formerly German East Africa and Zululand. The western boundary is formed by British Central Africa, Rhodesia and the Transvaal. The region is crossed by the Zambezi River, which divides it into two nearly equal sections. The area is 426,712 square miles. Most of the surface is low and swampy along the coast and rises to a higher level in the interior, which is covered with forests. The Namuli Mountains, with an altitude of 7,500 feet, and the Serra da Goron-

gaza are the highest elevations. Most of the region has an unhealthful climate for Europeans. The native inhabitants are Bantus, and they are generally engaged in agriculture, raising large crops of corn, tobacco, palm nuts, rubber, indigo, coffee and sugar. Some gold and coal are obtained. Laurenço Marquez, the capital, is connected with Pretoria by railway, and in all there are about 300 miles of railway in the colony. The other important towns are Mozambique, Quilimane, Sofala and Beira. Population, estimated at 3,120,000.

PORTUGUESE GUINEA, *gin'e*, a small Portuguese colony in Northwestern Africa, between Senegambia and the Atlantic Ocean. It includes a small coast territory and the Bissagos Islands. The area is about 14,000 square miles, and the capital is Bulama. Population, estimated at 289,000.

PORT WINE, a full-flavored red wine, first made in the upper valley of the Douro, Portugal, and named from Oporto, the chief port of shipment. The grapes, which have a strong flavor, are trodden under foot for twenty-four hours; the juice is then placed in vats to ferment. Alcohol is added from time to time, and the wine is then placed in storage and left four years to mature. A similar non-sparkling red wine made in California was named domestic port. See WINE.

PO'SEN, before and during the World War capital of the Prussian province of Posen. By the Treaty of Versailles (1919) the province was awarded to the newly-constituted republic of Poland (which see), because nearly all its people were Poles. The city of Posen is situated on the Warthe River, 150 miles east of Berlin. It is surrounded by two lines of forts, is built with considerable regularity and has, in general, fine wide streets and numerous squares, or open spaces. The most noteworthy public buildings are the Gothic cathedral, built in the eighteenth century; the parish church; the Church of Saint Mary; the Raczynski palace, which contains a large library; the townhall, and the royal palace. The manufactures of the city consist chiefly of furniture, agricultural implements and flour, and there are numerous distilleries. Population, 1910, 156,691.

POSTAGE STAMPS. The postage stamp was invented by Sir Rowland Hill of England, in 1840. Previous to its use postage on letters and other mail was generally paid upon delivery of the article, and the inconvenience to the postoffice department of collecting so many small sums became so great that some means of relief was found necessary. In this crisis the postage stamp was devised by Sir Rowland Hill, the Postmaster-General of England. Such was its success in England that it was soon adopted by the other European countries.

The United States government adopted the use of postage stamps in 1847. But previous to this date the government had allowed same postmasters and corporations to issue stamps on their own account as an experiment. This test was so successful that the government soon took over the work and made the issuing of postage stamps a government monopoly. Still their use was optional, and they did not come into general use until 1855, when the government made pre-payment of postage compulsory. There are two kinds—the adhesive stamp which we stick on letters and parcels, and the embossed stamp on stamped envelopes and newspaper wrappers.

Manufacture. The designs for postage stamps are made by the best artists the country can command. Several designs are usually offered by competing artists, and from them a commission selects the one considered the most desirable. The stamps are printed from steel-engraved plates on a press made especially for the purpose. As the paper passes through the press, it is printed and perforated, so that the stamps can be easily separated. The largest sheets are cut into sheets of 100 stamps each, before being distributed to postoffices.

POSTAL SAVINGS BANKS. See SAVINGS BANKS.

POSTAL UNION, INTERNATIONAL, a union for the purpose of establishing uniform postal regulations between nations and for concerted effort in handling the mails. Previous to the formation of the postal union in 1874, a number of postal treaties had been made, but they differed widely as to the details of handling international mail, and there was a lack of uniformity in rates of postage betwen different countries. The first postal union was formed by the independent Germanic states in 1850, and the idea of the present union was borrowed from that. The agreement is in the form of an international treaty, and was signed by representatives of all the nations participating. At present it includes the civilized world. A con-

gress of delegates of the nations interested meets every five years, to consider means of improving the postal service of the world. Each nation has one vote. The national headquarters are at Berne, Switzerland. The union has established uniform rates of postage for the exchange of mail between all its members.

POSTOFFICE DEPARTMENT, a department of government charged with the conveyance and delivery of letters, newspapers, magazines and all merchandise which the government considers legally mailable. The United States maintains the largest postoffice department in the world. There are over 56,000 postoffices and more than 300,000 employes, who handle one-third of the mail of the civilized world. The service delivers from 750,000 to 850,000 letters every hour of the day and night; the number of pieces of mail handled in the United States equals all the pieces handled in Great Britain, France, Germany and Russia. The entire system is under the control of the Postmaster-General, who is a member of the President's Cabinet.

History and Development. The beginnings of a postal service in the United States date from 1639, when a house in Boston was employed for the receipt and delivery of letters for or from beyond the seas. In 1672 the government of New York colony established "a post to goe monthly from New York to Boston;" a general postoffice was established in Virginia in 1692, and in Philadelphia in 1693. A deputy postmaster-general for America was appointed in 1692; at about the same time, a monopoly was established, which included, also, the transport of travelers, and a tariff was fixed. The system, however, proved a failure until 1753, when Benjamin Franklin became postmaster-general; when he was removed from office in 1774 the net revenue exceeded $15,000.

In 1789, when the Postoffice Department was transferred to the new Federal government, the number of offices in the thirteen states was only about seventy-five. The remarkable progress since the organization of the government is shown not only in the increase in the number of postoffices from seventy-five in 1790 to over 56,000 in 1919, and in the revenue from $37,935 to $388,975,962, but also in the expansion of the service and in the introduction of improved methods, and new lines of service for increasing the usefulness of the department. Chief among these are the negotiation of a postal treaty with England (1846); the introduction of postage stamps (1847); of stamped envelopes (1852); of the system of registering letters (1855); the establishment of the free delivery system and of the traveling postoffice system (1863); the introduction of the money order system (1864); the introduction of postal cards (1873); stamped newspaper wrappers and envelopes bearing requests for the return of the enclosed letter to the writer, in case of non-delivery; the formation of the Universal Postal Union (1873); the issue of "postal money orders" (1883); the establishment of a special delivery system (1885), under which letters bearing an extra ten-cent stamp are delivered by special messengers immediately on arrival, and the beginning of the rural free delivery system (1896), by which mail is delivered to rural homes by carrier regularly and without extra charge.

The Railway Postoffice. The railway postoffice, founded by George B. Armstrong, has been called the "backbone of the American postal system." In 1864 Mr. Armstrong induced some railroads to change the construction of their mail cars, so that mail could be sorted on the train. By this plan several hours were saved in the delivery of mail, for when a train reached its destination all mail going beyond that point was sorted and placed in pouches ready for immediate delivery to the next outbound train. The clerks on these traveling postoffices are thoroughly acquainted with the location of all postoffices and the railway connections over a wide range of country through which they travel, and they work with a marvelous degree of accuracy and rapidity.

Receipts and Expenditures. Revenue for the Postoffice Department is derived from postage only, and the expenditures are for paying salaries, for transporting the mails, for the upkeep of postoffice and for incidental expenses. Only occasionally does the revenue equal the expenditure, and the deficit is made up by an appropriation by Congress. In 1913, 1914, 1917, and 1918 the revenue exceeded the expenditures. In 1917 and 1918 this increase was due largely to the increase of the rates of postage to provide revenue for war purposes.

Classification of Postoffices. The postoffices in the United States are divided into

four classes, the division being based on their annual reports. The first class includes all offices whose annual receipts from the sale of stamps exceed $40,000; the second class, those whose receipts are from $8,000 to $40,000; the third class includes all offices whose yearly sales are from $1,900 to $8,000, and the fourth class includes all offices whose annual receipts are less then $1,900. Postmasters of the first-class offices receive salaries of $3,000 to $4,000, excepting in the largest cities; those of the second class receive from $2,000 to $2,900, those of the third class, from $1,000 to $1,900. Postmasters of the fourth class do not receive stated salaries, but are paid by percentage on the stamps cancelled in their offices. Whenever the annual revenue of a fourth-class office amounts to $1,000 it is placed in the third class. Postmasters of the first three classes of offices are appointed by the President, nominally for a term of four years. All fourth-class postmasters are under the civil service and are appointed by the Postmaster-General. Three-fourths of all the postoffices in the country are in the fourth class.

Classification of Mail. All mail matter is divided into four classes. The first includes letters, postal cards and anything closed against inspection; postage, 2 cents each ounce or additional fraction of an ounce; postal cards, 1 cent; registered letters, 10 cents in addition to postage. Second-class matter includes all newspapers or periodicals issued as frequently as four times a year; postage, 1 cent per pound or fraction thereof. When the newspapers are sent by persons other than the publishers, the charge is 1 cent for each four ounces. Mail matter of the third class includes books, circulars or proof sheets; postage, 1 cent for each 2 ounces; limit of weight, 4 pounds to each package. The fourth class embraces merchandise and all matter not included in the other three classes; this class is now known as the parcel post. In general, prepayment of postage by stamps for all classes of matter is required, but parcel post matter may be sent collect-on-delivery, and by a rule which took effect in 1914, letters which are accidentally mailed without postage may be collected for on delivery.

Rates of Postage. Domestic. First-Class Matter. Letters and other first-class matter, 2 cents for each ounce or fraction thereof. Postcards and postal cards, 1 cent each. (During the World War these rates were 3 and 2 cents.)

"Drop Letters," addressed for delivery at the office where mailed, 2 cents for each ounce or fraction thereof when deposited at postoffices where letter carrier service is not established. There is no drop rate on mail other than letters.

The limit of weight of first-class matter is four pounds.

First-class matter includes written matter, namely, letters, postal cards, postcards (private mailing cards) and all matter wholly or partly in writing, whether sealed or unsealed (except manuscript copy accompanying proof sheets or corrected sheets of the same and the writing authorized by law on matter of other classes). Also matter sealed or otherwise closed against inspection.

Letters written and mailed by soldiers, sailors and marines assigned to foreign duty engaged in the present war may be mailed free of postage.

Second-Class Matter. Newspapers and periodical publications of the second class, when sent unsealed by others than the publisher or a news agent, 1 cent for each four ounces or fraction thereof on each separately addressed copy or package of unaddressed copies. To be entitled to this rate the copies must be complete. Incomplete copies are third-class matter.

Second-class matter includes newspapers and periodicals bearing notice of entry as second-class matter. No limit of weight is prescribed.

The rates of second-class matter were increased in 1917 for those periodicals carrying a certain amount of advertising, and different rates were applied to different zones.

Third-Class Matter. On unsealed third-class matter the rate is 1 cent for each two ounces or fraction thereof on each individually addressed piece or package.

Third-class matter embraces circulars, newspapers and periodicals not admitted to the second class, nor embraced in the term "book," miscellaneous printed matter on paper not having the nature of an actual personal correspondence, proof sheets, corrected proof sheets and manuscript copy accompanying the same, and matter in point print or raised characters used by the blind. (Books are included in fourth-class or parcel post mail.)

The limit of weight of third-class matter is four pounds.

Fourth-Class Matter. For rates and instructions on fourth-class matter, see Parcel Post.

Registered and Special Delivery Letters. The fee for registering a letter is ten cents. The fee for special delivery is ten cents, for which there is a special stamp. These fees are in addition to the postage. Postage for letters to be sent by aircraft is sixteen cents per ounce.

Foreign Rates. The rates of postage applicable to articles for foreign countries are as follows:

	Cents.
Letters for Canada, Cuba, Mexico, Republic of Panama, city of Shanghai (China), England, Ireland, Newfoundland, Santo Domingo, Scotland and Wales, per ounce	3
Letters for Germany by direct steamers (in time of peace), per ounce	3
Letters for all other foreign countries, and for Germany when not dispatched by direct steamers:	
For the first ounce or fraction of an ounce	5
For each additional ounce or fraction of an ounce	3
Single postcards (including souvenir cards), each	3
Reply postal cards, each	3
Printed matter of all kinds, for each two ounces or fraction of two ounces	1
Commercial papers, for the first ten ounces or less	5
For each additional two ounces or fraction of two ounces	1
Samples of merchandise, for the first four ounces or less	2
For each additional two ounces or fraction of two ounces	1
Registration fee in addition to postage	10

Money Orders. See MONEY ORDER.

Postal Savings Banks. See SAVINGS BANKS, subhead *Postal Savings Banks.*

Canada. The Canadian postoffice system is organized on the same plan as that in the United States. There is a free delivery system in the larger cities, and rural delivery, begun in 1908, has developed rapidly. Money orders are issued payable in Canada, any part of the British possessions and the United States and its possessions. The fees range from five to twenty-five cents, according to the amount of the order.

Other Countries. The first letter post was established among the cities of the Hanseatic League (which see). There was a postal system in England in the time of Henry VIII, and the present English system is the outgrowth of that. The department is under the direction of the Postmaster-General, who is a member of the Privy Council and of the Cabinet. He is the only officer in the department who resigns on a change of the government, all the others being under civil service. The reorganization of the British postal system which placed it on its present basis was due to the efforts of Sir Rowland Hill, the originator of the postage stamp. The systems of all other European countries are modeled after the British system.

POTASH, a compound of carbon dioxide and potassium, used as a fertilizer and in the manufacture of glass and soap. It occurs in plants and in some rocks. The largest natural deposit of potash in the world is in the salt beds of Stassfurt, Germany. Similar deposits have very recently been found in Spain and Sicily. Before the World War the United States alone exported from Germany 250,000 tons of potash annually.

When the supply from this source was cut off by the war, efforts were started to procure potash from every available source, and by the close of the war the United States was producing 60,000 tons a year, one-third of which amount was obtained from the alkaline lakes of Nebraska. Some was produced by ashing the sea kelp of California and by leaching the green sands of New Jersey; it was also obtained from Alabama and Georgia shales; from the leucite deposits of Wyoming, from sugar beets and wood scourings. It has been found that potash can be extracted from the fumes of blast furnaces—Portland cement plants and pig iron furnaces—for potash occurs in iron ore, coke and lime; and it is estimated that enough potash can be recovered from this source to meet the entire need of the nation.

POTASSIUM, *po tas'si um*, a metallic chemical element, widely distributed in nature in combination with other substances, in plants, rocks and soils. It has nowhere been found in a free state in nature, and must be separated by electrolysis. Pure potassium is silvery white, is as soft as wax, and is the lightest of all metals except lithium. It has a strong affinity for oxygen, and in contact with water causes combustion, as it draws out the oxygen so rapidly as to generate enough heat to set the hydrogen afire. It is unaffected by perfectly pure, dry air, but in ordinary air becomes coated with a film of potassium hydrate and carbonate.

Among the numerous compounds of potassium are potassium carbonate, commercially known as potash (which see); potassium cyanide, a violent poison, used in photography and as a reducing agent; potassium bichromate, used in dyeing and in printing designs of fabrics; potassium nitrate, made by a double decomposition of sodium nitrate and potassium chloride, used in medicine and in the manufacture of gunpowder; and potassium chlorate, which also is used in the manufacture of explosives and in the arts as an oxidizing agent.

POTA'TO, one of the most popular and widely-used food plants in the world, be-

longs to the same family as the nightshade, the tomato and the tobacco plant.

The potato was discovered by the Spaniard's after the conquest of Peru, early in the sixteenth century, and by them it was taken to Europe, where it soon spread over the Netherlands, Burgundy and Italy. The plant is highly prized for the tubers, which are fleshy, underground stems, containing a large proportion of starch. As it was found in the wild state, the potato was small and of little

PRODUCTION ILLUSTRATED

The figures represent the average crop in millions of bushels in the United States and Canada, in the principal potato-producing areas.

value, but the numerous varieties now in general cultivation have been obtained by improving the original species. The value of this plant for food can scarcely be overestimated. At the time of its discovery many countries of Europe were overcrowded and suffering frequent famines, from the failure of their grain crops. Since the potato would thrive in soils where grain could not profitably be raised, it added an important source of food to these countries.

The top or stem is nearly square; it branches frequently, and grows to the length of from two to four feet, according to the richness of the soil. The blossoms are about three-fourths of an inch in diameter and are white, bluish or pink. The fruit proper is a spherical berry, about the size of a cherry. When ripe it is reddish-brown or purplish and contains a large number of small seeds, but the plant is propagated by planting the tubers, from the eyes of which new plants spring. Varieties are produced from the seeds, but the seed seldom reproduces a variety like that from which it sprang.

Besides its extensive use as an article of food, the potato is used as feed for stock and for the manufacture of starch. Tubers of the best quality are obtained in cool temperate climates, where soil and moisture are favorable to their growth. In the United States, New York is the leading producer, with an average yearly crop of nearly 34,000,000 bushels. Michigan ranks second, with an annual average of about 33,000,000, and is followed in order by Wisconsin, Minnesota, Maine, Pennsylvania and Iowa. The total crop for the country is about 400,000,000 bushels a year. Canada produces about 80,000,000 bushels a year, of which Ontario and Quebec each yield nearly one-fourth.

The Burbank Potato. At the age of nineteen in his home in Massachusetts, Luther Burbank heard the complaints of farmers who were unable to raise more than 200 bushels of potatoes to the acre. They clamored for a variety which would yield a larger acreage and enable them to make a little money from their labor. This young man began his experiments in crossing and development and the fourth year produced a potato so much improved in size and quality that an eastern seed house gave him $125 for the sole right to use and produce the better variety. They named this the Burbank potato. At once this variety began to yield 435 bushels to the acre and since that time has produced 525 bushels. The United States Department of Agriculture, in a bulletin, gives credit to Mr. Burbank for adding $17,000,000 a year to the agricultural output of the country, due solely to the development of the Burbank potato. See BURBANK, LUTHER.

POTATO BUG, or COLORADO BEETLE, a small beetle of yellow color, with ten black stripes on its wings. It is a native of the Rocky Mountains, where it lived, until the country was settled, upon the wild-potato plant. When the cultivation of potatoes was begun in the West, the beetles thrived and multiplied in astonishing numbers, and by 1875 they had spread all over the United States and Canada. The beetles lay their

POTATO BUG, YOUNG AND EGGS

orange-colored eggs on the under sides of the leaves of the new plants. In about a week these hatch into reddish slugs which feed hungrily upon the leaves and grow rapidly, fading in color and developing two

rows of black spots along the sides (see illustration). When they have reached maturity they drop off, burrow in the ground, and in about ten days emerge as full-grown beetles. There are sometimes as many as five broods a season. Spraying with preparations of Paris green will protect the plants; if the beetles are numerous the plants must be constantly tended.

POTO'MAC RIVER, a river of the United States forming the boundary between Maryland and Virginia and Maryland and West Virginia. The Potomac is about 430 miles long and is formed by two branches which rise in the Alleghany Mountains and unite fifteen miles southwest of Cumberland, Md. The Monocacy, Shenandoah, Bull Run and Cacapon are its chief tributaries. The Potomac flows past Alexandria, Va., Washington, D. C., and Mount Vernon, the home of Washington. The picturesque gorge known as Harper's Ferry is memorable as the scene of John Brown's raid. In the upper part of its course the river is rapid and affords abundant water power. In its lower course the river broadens to meet Chesapeake Bay, into which it flows. The tide extends to Washington, 125 miles from the mouth.

POTS'DAM, PRUSSIA, capital of the province of Brandenburg and formerly the second royal residence of the kingdom, is beautifully situated in the midst of wooded hills, seventeen miles southwest of Berlin, on the Havel. The principal buildings are the royal palace, Garrison Church, a French Protestant church, the town house, the Church of Saint Nicholas and the Barberini Palace. The palace of Sans Souci, in the vicinity of the city, was erected by Frederick the Great. In the neighborhood are the New Palace and Marble Palace. The city contains a number of public gardens and squares adorned with statues. The raising of winter violets is an important industry. The manufactures include optical instruments, sugar and beer. Population, 1910, 62,243.

POTAWATOMI, *pot ta waht'o my*, a term meaning *fire makers*, refers to an Algonquian tribe, first met by the whites near Green Bay, Wis. They subsequently moved south and settled on former Miami territory, where Chicago now stands. After the Illinois were driven out, the Potawatomi occupied the greater portion of what is now the state of Illinois and the southern part of Michigan and Northern Indiana. About 900 Potawatomis living in Oklahoma are American citizens. There are other groups in Kansas, Indiana, Wisconsin and Michigan, and all told they number about 2,500.

POTTERY, vessels or utensils made from clay and hardened by firing. The art is known as ceramic from the Greek word *keramos*, meaning *pottery*.

History. Pottery making is one of the oldest of the arts, and has been practiced by primitive people as well as by civilized nations. Works found in Egypt and Babylonia as well as in the buried cities of Asia Minor and Greece attest to the skill these peoples attained in the manufacture of this ware. The Romans learned the secrets of pottery making from the Greeks and Etruscans, and with the extension of the Roman Empire their knowledge was disseminated to all parts of the civilized world. The Chinese and Japanese for centuries have excelled in the manufacture of delicate ware, and modern pottery is made on an extensive scale in leading countries of Europe and many cities of the United States. The Pueblo Indians of Southwestern United States and Northern Mexico were especially adept in pottery making. The manufacture of white ware was begun in America in 1685, and there has been a steady increase in the industry until at the present time the annual output is estimated as $35,000,000; the largest potteries are located in Cincinnati, Jersey City, and on Long Island.

Varieties of Clay. Pottery is made of various grades of clay, to which sometimes small proportions of fine sand, powdered feldspar or flint are added, the kind and proportion of these ingredients determining the sort of ware.

Clays that contain any appreciable quantity of iron turn red when burned, as in the making of brick, and much of the coarsest grade of earthenware is made of this kind of clay. Other varieties turn to a cream color, and others become a reddish-brown. The finest quality of clay used for pottery is known as *kaolin* and is pure white. Some

varieties of clay contain enough sand to make the glaze or enamel, but for most wares this must be added. The glaze is made by different substances for different wares. That of stoneware, such as common jugs and crocks, is made by throwing common salt into the furnace, where it is decomposed and fuses with the clay. Other varieties of stoneware are glazed by a mixture of white lead, flint and glass ground together; while porcelain is glazed by still another composition.

Working the Clay. The first step in making pottery is to grind the clay to a very fine powder, which is mixed with water into a doughlike mass. In the manufacture of ordinary stoneware, a quantity of this dough sufficient for the vessel is attached to a horizontal wheel called the *potter's wheel,* which is worked by foot power. The workman forms the clay into a cone with a blunt apex. Then by inserting his thumbs into the apex of the cone and revolving the wheel, he roughly shapes the vessel with his hand. After this, the walls are pared and smoothed inside and out by tools of wood or leather. During the working, the clay, tools, and hands of the workmen are kept moist. When shaped, the vessel is placed in the drying room, where it is allowed to harden, after which it is ready for burning.

Firing. Vessels that are not round are usually cast in molds, made of plaster of Paris, each half of the vessel being made separately and the parts joined together when taken from the molds.

Pottery is burned, baked or fired in kilns, which vary in size and shape according to the sort of ware for which they are designed. The higher grades of ware are placed in cylindrical earthen boxes, called *saggers.* The saggers are stacked in the kiln by packing in tiers, one above the other. The ware is usually raised to a white heat, which is maintained for thirty-six hours or more, after which the kiln is allowed to cool slowly. When cold, the ware is taken from the saggers, and in this state it is called *biscuit.* The rough places on the surface are now smoothed, and other finishing touches are given, after which the ware is glazed.

Glazing. The process is accomplished by dipping the ware in a mixture called the *slip.* This is a solution of the glazing substance in water and is but little thicker than milk. The ware is dipped in, and on being removed, it is so handled that no drops are left standing on the surface. The porous walls absorb the water and leave a thin coating on the surface, which, on a second firing, passes into the clay and forms the glaze. By the addition of necessary pigments, coloring can also be produced with the glaze. When this is poured on and allowed to run down until stopped by the heat, beautifully shaded effects are often produced.

Decorations are usually put on with a brush, either before or after glazing. If decorated after glazing, the ware must be fired a third time. Decorating requires great care and skill, as the colors, when put on, are entirely different from those which will appear after firing. For instance, gold is put on in the form of a chloride which has a brown color.

Varieties. Among the common varieties of pottery are the following:

Earthenware, which includes all of the coarser grades, from the ordinary stoneware, of which jugs and crocks are made, to the heavier grades used for culinary and table purposes. Earthenware is undoubtedly the earliest form of pottery, and rude articles are found among all uncivilized people.

Stoneware, a high grade of earthenware. The term is often applied to numerous varieties in most common use. It is hard, well enameled and often beautifully decorated.

Chinaware or **Porcelain,** the finest grade of pottery. It is made by mixing the best quality of kaolin with a Chinese clay containing a little silica. When fused at a high temperature these ingredients produce a beautiful translucent ware. Porcelain originated with the Chinese, hence the name china, or chinaware. It is known to have been manufactured as early as 950 B. C. From China and Japan come the most delicate and beautiful specimens of this ware. The manufacture of china was introduced into Europe early in the sixteenth century, and numerous establishments now exist both on the Continent and in England. The oldest and best known of these is near Dresden, Saxony, and from this city the ware has taken its name. Dresden china has attained wide popularity and is prized for its excellent quality and beautiful finish.

Related Articles. Consult the following titles for additional information:

China Painting	Kaolin
Clay	Majolica
Delft	Porcelain
Dresden China	Rockwood Pottery
Faience	Wedgwood Ware

POTTS'TOWN, PA., in Montgomery County, thirty-five miles northwest of Philadelphia, on the Schuylkill River and on the Pennsylvania and on the Philadelphia & Reading railroads. It contains rolling mills, blast furnaces, steel mills, bridge works, textile

mills, silk, shirt and hosiery works and manufactories of nails, agricultural implements, cigars and other articles. The borough has a school library, two hospitals and the Hill School, a private institution for boys. The place was established in 1752, and was called Pottsgrove until its incorporation in 1815. Population, 1910, 15,599; in 1917, 16,987 (Federal estimate).

POTTS'VILLE, PA., the county seat of Schuylkill County, thirty-five miles northwest of Reading, on the Schuylkill River and on the Philadelphia & Reading, the Pennsylvania, the Lehigh Valley, and the People's railroads. The borough is surrounded by anthracite coal fields, and is principally engaged in mining. It was here that anthracite coal was first used successfully for smelting iron ore. There are two railroad shops, a large steel plant, and manufactories of plush, velvet, explosives, machinery, textiles, bolts, nuts and shoes. The borough has a hospital, a very fine courthouse, a hospital and the Pottsville Athenaeum, which contains a library. The place was settled about 1800, was laid out as a town by John Pott in 1816, was incorporated as a borough in 1828 and was made a city in 1851. The commission form of government was adopted in 1914. Population, 1910, 20,236; in 1917, 22,717 (Federal estimate).

POUGHKEEPSIE, *po kip'si*, N. Y., the county seat of Dutchess County, seventy-four miles north of New York City, on the east bank of the Hudson River and on the New York Central and the Central New England railroads. A ferry connects with the West Shore railroad, and electric railways extend to neighboring places. The city is built on an elevation about 200 feet above the river. It is the seat of Vassar College, Glen Eden Seminary and a famous business college; it also has the Adriance Library, a state hospital for the insane and four hospitals. A cantilever bridge, 7,100 feet long, which here spans the Hudson, is of interest. The important industrial enterprises of the city include mowing-machine works, foundries, machine shops, a shoe factory, packing houses, lumber mills and manufactories of patent medicines, underwear, plows, cigars and cigarettes and other articles.

The place was settled by the Dutch in 1698, on the site of an Indian village called Apokeepsing, meaning *safe harbor*. During the Revolution, after 1778, it was the capital of the state, and the convention which ratified the Federal Constitution met here. It was made a village in 1799, and was chartered as a city in 1854. Population, 1910, 27,936; in 1917, 30,786 (Federal estimate).

POULTRY. In its broadest sense this term is applied to all domesticated birds—the hen, the duck, the goose, the turkey, the guinea fowl and a few other varieties—but the prominence which the chicken industry has gained in the last few years has caused poultry raising to mean chicken raising.

This industry attracts a large number of people because it leads to a pleasant out-of-doors life, and because, for the capital invested, it yields larger returns than any other branch of farm industry, provided those who enter upon it have a liking for the business and are willing to be patient and industrious workers. It is wise for one not acquainted with the business to begin with a small flock of chickens, and to add to these from time to time as his success will warrant. Some failures are bound to occur, and the wise poultryman, instead of becoming discouraged, will look for the causes of these failures and try to remove them.

Classification of Breeds. In the United States, poultrymen divide all breeds into three general classes; these are egg breeds, meat breeds and general-purpose breeds. Before selecting his stock the poultryman must decide whether he wishes to make eggs or meat his leading product or whether he wishes to supply both eggs and meat for the market. By this, we do not mean that should he decide upon eggs as his chief source of income he will have no meat to sell, or should he decide upon meat as his chief source of income he will have no eggs to sell. But if he selects egg breeds, he will have less meat, and if he selects meat breeds he will have fewer eggs for the market.

Egg Breeds. Most poultry farms center their interests on the production of eggs, since the largest revenue is derived from this source. Such farms are stocked with some one of the leading egg breeds. Among these, the Leghorns and the Minorcas are declared to be the best. Chickens belonging to the egg breeds are small and active, and they mature early.

Meat Breeds. These include chickens of a large size, such as the Cochins and Brahmas. They move slowly, mature late and are not good layers.

PRIZE WINNERS AT THE NATIONAL POULTRY SHOW, CHICAGO, ILLINOIS

1. White Leghorn Cock.
2. Buff Leghorn Cock.
3. Wyandotte Pullet.
4. White Rose Comb Minorca Cock.
5. White Plymouth Rock Cock
6. Barred Plymouth Rock Cock.
7. Black Orpington Cock.
8. Rose Comb Rhode Island Red Hen.

General-Purpose Breeds. These are medium in size, between the egg and the meat breeds, and they are found on most farms devoted to general farming. They are fair layers, and when mature furnish birds for the table weighing from six and one-half to eight and one-half pounds. The most popular general-purpose breeds are the Plymouth Rock, the Orpington and the Rhode Island Reds.

Care of Poultry. Eternal vigilance is the price of success on a poultry farm. A dry, sunny slope with good, natural drainage and plenty of shade is the most desirable plot for a chicken run. The plot of ground should be large enough to give the chickens ample room to run about, for they require a good amount of exercise. The chicken house should be convenient, and have ample provision for ventilation and cleanliness. It should protect the fowls from cold in winter and from heat in summer, and be so constructed as to prevent the entrance of rats, vermin and other chicken pests. Complete directions for constructing these houses are easily obtained from state agricultural experiment stations and from the United States Department of Agriculture, Washington, D. C.

Chickens should be fed with care, because the quality of both the eggs and the meat is affected by the feed. Layers should have a diet of grain, green food and animal food, and should be supplied with mineral matter that enters into the composition of eggshells. Grit and sand should also be readily accessible. Corn is considered the standard grain for fattening chickens, but wheat, oats and buckwheat are essential for layers. Chickens should be fed at regular intervals, and no more food should be given them than they will eat at the time.

Related Articles. Consult the following titles for additional information:

Duck	Guinea Fowl
Egg	Incubator
Fowl	Pheasant
Goose	Turkey

POUND, a unit of weight employed in measuring many commodities. Three units are recognized—the *avoirdupois,* the *troy* and the *apothecaries'* pound.

Avoirdupois Pound. The avoirdupois pound is the unit of common weights in the English system of weights and measures. It contains 7,000 grains, and is divided into sixteen ounces.

Troy Pound. The troy pound is used in weighing gold, silver and precious stones. It contains 5,760 grains, and is divided into twelve ounces.

Apothecaries' Pound. This has the same weight as the troy pound, but it is divided differently. It is used by pharmacists in compounding medicines.

The grain in all these pounds is the same.

Pound Sterling. This is the highest denomination in English money, and is equivalent to $4.8665 in United States and Canada money. The pound sterling received its name from the fact that a quantity of silver of that value weighed one pound. See WEIGHTS AND MEASURES.

POWDERLY, TERENCE VINCENT (1849–), an American labor leader, born at Carbondale, Pa. He worked as a switchman, car repairer and machinist and became influential in labor organizations. He was elected mayor of Scranton on the Labor ticket in 1878 and was reëlected in 1880 and 1882. Six years later he was admitted to the Pennsylvania bar. He was commissioner-general of immigration from 1897 to 1902 and later was chief of the Division of Information in the Bureau of Immigration, Washington. He wrote *Thirty Years of Labor, The Labor Movement* and *The Problem of To-Day.*

POW'ELL, JOHN WESLEY (1834–1902), an American geologist, born in Mount Morris, N. Y., and educated in Illinois College, Jacksonville, and at Oberlin College, Ohio. In the Civil War he rose to be lieutenant colonel, and at the close of the war he became professor of geology in the Illinois Wesleyan University at Bloomington and later in the Illinois Normal University. In 1867 and years following, under direction of the Smithsonian Institution and the department of the interior, he conducted the geographical and geological survey of the Rocky Mountain region and was the first to explore the canyons of the Colorado. His *Contributions to North American Ethnology,* the results of his work, gained him recognition in the scientific world. In 1881 he was appointed director of the United States Geological Survey. His publications include many scientific papers and addresses and numerous government volumes. He served as president of the Anthropological Society of Washington and of the American Association for the Advancement of Science.

POWELL, MAUD (1868–1920), American violinist. She was born at Peru, Ill., and at

the age of thirteen began her musical studies at Chicago. From there she went, in 1881, to Europe, studied with Schradieck at Leipzig, with Dancla at Paris, and with Joachim at Berlin, and in 1885 made her début with the Berlin Philharmonic Society, with marked success. In the years that followed her reputation grew rapidly, and she came to be regarded as the greatest of women violinists. She has appeared with distinction as soloist with many great orchestras and has played in nearly every large city in the world. In 1904 she married H. G. Turner of London.

POWER, in mathematics, the product obtained by using a number as a factor two or more times. The product of a number multiplied by itself is the second power, or square of that number; the product obtained by taking a number three times as a factor is the third power, or the cube of the number; four times, the fourth power, and so on. For example, $4\times4=16$; 16 is the square of 4; $4\times4\times4=64=4^3$; 64 is the cube of 4. The figure denoting the power to which a given number is to be raised is placed at the right and above the given number and is known as the *exponent*. The process of finding a power of a number is called *involution*.

POWER OF ATTOR'NEY, an instrument authorizing the person to whom it is granted to act as the agent or attorney for the person granting it. A *general* power of attorney authorizes the agent to act in all cases for his principal. A *special* power of attorney restricts the agent to the particular acts named in the instrument. Courts hold the agent rigidly to the acts specified in the instrument. When the agent is required to execute an instrument under seal, his power of attorney must also be under seal. The death of the principal revokes the power of attorney. See AGENT.

POWERS, HIRAM (1805–1873), an American sculptor, the son of a farmer, born at Woodstock, Vt. As a boy he was employed in a clock factory in Ohio, whither his family had moved, and later he obtained employment in a museum in Cincinnati, remodeling and repairing wax figures. At this period he formed the acquaintance of a German sculptor, and having been taught modeling by him, he determined to become a sculptor. In 1835 he went to Washington and had sufficient success there to enable him to proceed to Italy. He settled in Florence, where he resided until his death. His ideal pieces include *Eve Tempted, Eve Disconsolate, Proserpina, Fisher Boy* and *The Greek Slave*, the last a chaste and beautiful female nude. Powers' best work was done on portrait busts, and his heads of Franklin, Jefferson, Washington, Webster, Calhoun, Everett and Sheridan are in his best manner.

POWHATAN (1550–1618), *pou ha tan'*, an Indian chieftain, whose real name was WAHUNSONACOOK, Powhatan being the name of this tribe. Thirty-four tribes were under his rule, and his dominions extended from the head of Chesapeake Bay to the Roanoke River and inland about two hundred miles. He lived about fifteen miles from Jamestown, and had frequent dealings with the colonists. He took prisoner Captain John Smith, and, it is said, spared his life at the intercession of his daughter Pocahontas. After Rolfe became his son-in-law Powhatan was a friend of the English. See POCAHONTAS.

PRAETOR, *pre'tor*, an important magistrate in the ancient Roman state. The word means *leader*, and originally the name was merely an honorary title born by the two consuls, but in 367 a new office was created, next in rank to the consular, and the incumbent, whose duties were judicial, was called praetor. Only patricians were eligible to the office until 337 B. C. In the middle of the third century two praetors were elected, the term of office being one year. The number was gradually increased, and in the time of the empire the number was sixteen. As the number of praetors increased the duties were divided. In 246 B. C. was instituted the office of *praetor urbanus*, whose duty it was to settle disputes between citizens; and that of *praetor peregrinus*, who dealt with differences between foreigners and citizens. From 149 B. C. the praetor acquired criminal jurisdiction. The later praetors served a year as judicial administrators and a year as provincial governors.

PRAETORIAN, *pre toh'ri an*, **GUARD**, the bodyguard of the Roman emperors, made up of selected soldiers. Augustus organized the guard into nine cohorts, each consisting of 1,000 men, and made it a permanent institution. Under the later emperors the praetorians were increased in numbers and given double pay and greater importance. In time they gained the chief power in the state and were able to appoint, depose or murder emperors at will. It was only by bribery of the praetorian guard that a man

could secure the imperial dignity or could maintain it after he had secured it. Constantine abolished the institution in 312.

PRAGMAT'IC SANCTION, *sank'shun,* the name given, originally in the Byzantine Empire, to any important decree regarding affairs of state. The most important pragmatic sanction in the history of Europe was that issued by Charles VI, Holy Roman emperor, making his daughter, Maria Theresa, his successor to the throne. See CHARLES VI; MARIA THERESA.

PRAGUE, *prayg,* BOHEMIA, the largest city and capital of the Czecho-Slovak Republic, is situated in Bohemia, on the Moldau River, 160 miles northwest of Vienna and seventy-five miles southeast of Dresden. The city is built upon both sides of the river, which is crossed by a number of fine bridges. The site is upon low hills, which rise gradually from the river. The city comprises seven districts, of which the Alstadt is the most interesting and most important commercially. Here, clustered about Grosser Ring, or the Great Square, are the Teynkirche, or the old Hussite Church; the Kinsky Palace; the townhall; the Kreuzherrenkirche, constructed after the plan of Saint Peter's at Rome; the Palace of Clan Gallas, the former palace of the Bohemian kings, and the Rudolphinum, a structure containing the conservatory of music, a museum of industrial arts and a picture gallery. Near by are the old university buildings, some of which date from the Middle Ages. In the Cathedral of Saint Viet, in the district of Hradschin, is the marble tomb of the Bohemian kings.

The modern buildings include the Bohemian National Theater, the German Theater and the Bohemian National Museum. The city also contains a number of monuments and statues. The leading educational institution is the University of Prague, which dates from the Middle Ages (see PRAGUE, UNIVERSITY OF). The other educational institutions include the Royal German and Royal Bohemian Polytechnic institutes, a school of art and a conservatory of music. The city also is the home of several distinguished learned societies.

Prague was the third largest industrial city of the former Austro-Hungarian monarchy, following Vienna and Budapest. Most of the manufactories are located in the suburbs. The leading industries include the manufacture of engines, machinery, leather, railway cars, chemicals, spirituous liquors, carriages, furniture, gloves, cotton goods and underwear. There are a number of breweries and flouring mills, and the printing and publishing business is of considerable importance. Population, 1910, 223,741; in 1914, of city and suburbs, 541,500 (estimated).

For historic events connected with the World War see Bohemia; Czecho-Slovak Republic; Austria-Hungary, subhead History.

PRAGUE, UNIVERSITY OF, a name given to two universities situated in the city of Prague, one German and the other Bohemian, or Czech. The original University of Prague is the oldest German university. It was founded in the middle of the fourteenth century, but was based on a school that originated about one hundred years before. During the Middle Ages it suffered many changes and reverses, because of the religious conflicts by which it was disturbed. In 1419 the Catholics were expelled from the institution, and as a result the university lost much of its property and a large number of students. In the later part of the fifteenth century a number of colleges were founded, and the university again began to prosper. In the middle of the seventeenth century it became a Jesuit college.

The Czech movement of the nineteenth century resulted, at first, in an increase of attendance, but finally in the organization of the Czech University of Prague. In 1882 and 1883 the faculties of law, medicine and arts were established, to which some years later the faculty of theology was added. This gave the Bohemian university a prestige which enabled it to overshadow the German university, and it helped to keep alive that national consciousness which had its outcome in the establishment of the Czecho-Slovak Republic (which see). Before the World War the Czech University had an attendance of 4,400, while that of the German University was only 1,965.

PRAIRIE, *pra'rie,* the name given to the vast natural meadows or plains of the Mississippi basin, especially the region lying between that river and the Rocky Mountains and extending northward into Central Canada. Throughout this immense territory the differences of level are sufficient to produce a steady flow of the rivers, but not so great as to obstruct their navigation, thus securing a unique system of easy intercommunication by water between all sections of the country. There is a sameness in the features of the sur-

face, the vegetable productions, the soil and the geological features. Some of the prairies that have a peculiarly undulating surface are known as *rolling prairies*. Where vast herds of buffaloes used to roam over the prairies, immense tracts are now cultivated and produce large crops of wheat and maize. The prairies now constitute the most valuable agricultural region in the world.

PRAIRIE CHICKEN, a common name in the United States of the pinnated grouse. See GROUSE.

PRAIRIE DOG, a sort of ground-squirrel, once found numerously on the prairies west of the Mississippi and east of the Rocky Mountains. It is about one foot in length, exclusive of the rather short tail, is sturdy and

PRAIRIE DOG

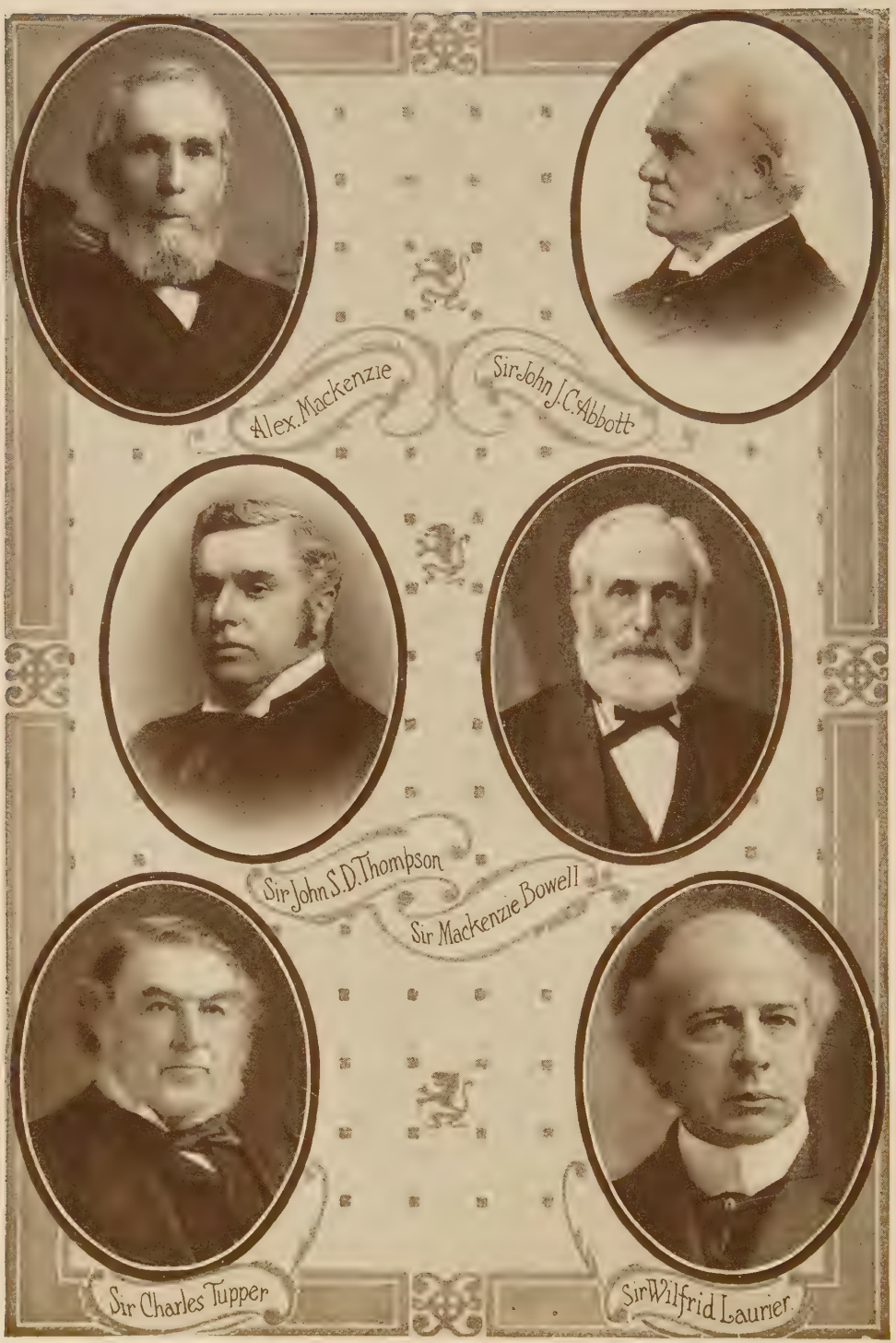
stout in form, and has coarse gray hair. The animals live in colonies, in burrows, which are ingeniously built, having a mound of earth encircling the opening to prevent the entrance of surface rain water. These colonies at an early day sometimes covered several hundred square miles. According to government estimates, the vegetable food consumed by such a colony would feed 1,500,000 cattle.

PRAXITELES, *prax it'e leez*, one of the greatest sculptors of ancient Greece, a citizen, if not a native, of Athens. He flourished about the middle of the fourth century B. C. Whereas Phidias had portrayed heroic subjects, Praxiteles sought to reproduce the beauty of the human in the nude. He executed several statues of *Apollo* and of *Aphrodite*. His *Aphrodite at the Bath*, in the Vatican, made for the city of Cnidus, was so highly valued by the Cnidians they refused to sell it to King Nicomedes, who, according to Pliny, was willing to take it as payment of the enormous debt imposed on the city. The group *Niobe and her Children* at Florence, Italy, and *Hermes Carrying Dionysus*, found at Olympia in 1877, are attributed to him. His gods and goddesses are not as majestic and awe-inspiring as are the deities of Phidias, but are superlatively beautiful human beings, endowed with a delicate grace and charm. He worked in both marble and bronze, and his figures served as models to the artists who succeeded him.

PRECES'SION OF THE EQUINOXES. When the ecliptic (the plane passing through the center of the sun and containing the earth's orbit) intersects the plane of the earth's equator the equinox occurs—once in spring, once in autumn. The time of occurrence varies slightly each year, owing to the attraction of the sun, moon and planets, so that each successive equinox arrives ahead of what would be its schedule if those celestial influences were removed, at the mean rate of 50′ 37″ annually. This motion of the equinox along the ecliptic carries it, with reference to the diurnal motion, continually in advance upon the stars; the place of the equinox among the stars, with reference to the diurnal motion, thus precedes at every subsequent moment that which it previously held, hence the name. This sweeping round in the heavens of the equinoctial line indicates a motion of the axis of rotation of the earth, such that it describes circles round the poles of the ecliptic every 25,791 years. From the precession of the equinoxes and nutation in combination, the axis follows a sinuous path, instead of a circle, about the pole of the ecliptic (see NUTATION). At present the vernal equinoctial point is in the zodiacal sign Pisces, and it is moving toward the sign Aquarius.

PRECIOUS STONES, or **GEMS**, stones of small size greatly esteemed for their beauty. They are sometimes found crystallized in regular shapes and with a natural polish, but they are more commonly of irregular shapes and have rough coats. The term *gem* often denotes more particularly a stone that is cut, polished or engraved, and it also includes pearls and various artificial productions. The most valuable gems are diamonds, emeralds, rubies, sapphires, opals and turquoises. Of less value are the garnet, the almandine, the tourmaline, the topaz, the amethyst, the chrysoprase, the chrysoberyl, the aquamarine, the heliotrope and the azurite. Agate, lapis lazuli and cornelian can scarcely be called gems.

In art and archaeology, the term gem is usually applied to a precious stone cut or engraved in ornamental designs or with inscriptions. Stones on which the design is raised above the general surface are called



A GROUP OF PREMIERS

cameos; those having the design sunk below the surface are called *intaglios.* Early specimens of cut gems are seen in the scarabaei, or beetle-shaped, signets worn in rings by the ancient Egyptians. Among the Greeks, Etruscans and Romans, gem sculpture held a high place, reaching its highest point under Augustus. Modern gem engraving dates from the beginning of the fifteenth century, the chief seats of the art being Italy and Germany. Rome is now the headquarters of the seal-engraving art.

From the earliest times precious stones have held definite meanings to people. Astrologers, or those who professed to read the stars, believed that precious stones also influenced the lives of people, and from the first century there was a special stone dedicated to each month of the year. Even wise men wore gems as charms, believing them to ward off disease and to bring good fortune. All ancient peoples of civilization used gems, and ascribed to each stone some special influence. In the Bible there are many references to precious stones; those worn on the breastplate of the High Priest were among the most significant features of his attire (*Exodus* XXVIII, 15–30). In the following passage the Jewish historian ascribes miraculous properties to these stones:

> From the stones which the High Priest wore there emanated a light, as often as God was present at the sacrifice; that which was worn on the right shoulder instead of a clasp, emitting a radiance sufficient to give light to those far away, although the stone previously looked its splendor.

See Gems, Artificial; Birthstones; also articles on the gems named in the beginning of this article.

PREDESTINA'TION, a term used in Christian theology, derived from the Latin words meaning *determined beforehand.* In general, it means that God in the beginning so made the universe that everything that occurs in it is inevitable. As applied specifically to the life of man, the doctrine involves the belief that God "appointed certain men unto salvation," others to reprobation. The conception is a logical outgrowth of the belief that salvation in this world of sin would be impossible unless foreordained by God. It was developed by John Calvin, its chief supporter. It is opposed to the doctrine of free will, and has few adherents to-day.

PREEMP'TION, a right given under early public land laws to citizens of the United States, by which they could buy quarter-sections of the public land for a nominal price, by complying with certain conditions. A citizen who entered a preëmption claim was given preference over all other persons. The preëmption laws differed from the homestead laws in not requiring occupation or cultivation. They were repealed in 1891, because of abuses that had become general. See Homestead Laws; Lands, Public.

In international law, preëmption is the right of one nation to seize property belonging to another nation, while it is being shipped across the former's territory. The right is used only in the case of property that is or may be contraband of war, and full value is given to the owner of the property. See International Law.

PREMIER, *pre meer',* meaning *first,* is the chief officer of state in a government Cabinet. He is known variously as Prime Minister, Chancellor, Grand Vizier, etc. In the constitutional nations of Europe, the Cabinet form of government, as fully developed by England, has been more or less faithfully copied, consequently there is in each of these countries an official corresponding to the English Premier. Canada and Australia have Premiers, but the United States has no such officer; its Secretary of State is not at all like the Premier of England. He does not select the other members of the Cabinet, is not superior to them, and is not responsible to Congress.

The Premier in Canada. As the members of the Cabinet only hold office as long as they are supported by a majority in the House of Commons, most of the Ministers are members of the lower house, though several are always Senators. The Ministry, therefore, is practically a committee made up of members of both Houses. Its head is known as the Premier or Prime Minister, though he is legally known as President of the Privy Council.

The title Premier originates from the fact that, as in England, he is the first called on to form a new Ministry. As the leader of a political party and as a man of commanding influence and ability, he is chosen to lead the Houses and control the government. It may be safely said, as a rule, that the government's policy is his policy, though each individual Minister has the right to communicate directly with the Governor-General, on all important public matters. Communication between the Cabinet and the Governor-

General takes place through the Premier. If the Premier dies or resigns, the Cabinet is dissolved, and the Ministers hold office only until a new Ministry is formed. In case the government, that is, the Ministry, is defeated on some important issue in Parliament, the Premier must either resign or convince the Governor-General that a new general election should be held, on the ground that the vote does not represent the popular sentiment.

Related Articles. Consult the following titles for additional information:

Cabinet
Governor-General
Ministry
Privy Council

PREPOSITION, *prep o zish'un,* in grammar, a part of speech that introduces a phrase modifier and shows the relation between the principal word of the phrase and the word the phrase modifies. Examples of prepositions are *in, of, on* and *over.* In the sentence, "The house stands *on the hill,*" the preposition *on* shows a relation between the word *hill* and the verb *stands,* which the phrase modifies.

PRE-RAPHAELITES, *pre raf'a el ites,* a group of English painters and writers organized in 1848, so called because they derived their inspiration from painters before the time of Raphael. Leaders in the movement were Dante Gabriel Rossetti, his brother William Michael, John Everett Millais and William Holman Hunt. The art of these men represents a reaction against the artificial tendencies of their day, and a return to the simplicity and spirituality of such early painters as Giotto, Fra Angelico and others of the early Renaissance. The movement exerted a wholesome and far-reaching influence on English art.

PRESBYTE'RIANS, members of a branch of Protestantism in which the local churches are governed by *presbyters,* or elders. The officers of a Presbyterian church are the pastor, elders and deacons. The pastor, together with the elders, looks after the spiritual affairs of the church, and the trustees look after the financial affairs. The pastor and elders constitute a *session,* which has power to admit and to discipline members. The session is under the control of a *presbytery,* which is composed of the ministers and one or more elders from each church in a given district. Presbyteries combine to form a *synod,* and, controlling all, is the *general assembly,* which meets annually and to which synods can appeal certain cases. In the United States appeals are restricted to cases involving doctrine and government.

The Presbyterian creed is found in the Westminster Confession of Faith and in the Longer and Shorter Cathechisms. In 1902 the general assembly adopted some important revisions of the creed. The doctrine of predestination was modified so as to embody the idea that God loves all mankind and that no man is condemned, except for his own sin; the article concerning infants who die before baptism was modified to embody the idea that all who die in infancy are saved by Christ, through his spirit.

History. John Calvin (see CALVIN AND CALVINISM) is considered by some to be the originator of this form of church government, though elders constituted the ruling body among the Waldenses (see WALDENSES). Presbyteries were formed in England during Elizabeth's reign, though much against her will. The Presbyterian creed, confession of faith and form of church government and directory for worship were formulated by an assembly in 1647 and approved by Parliament in the same year, but they were never established in the Church of England. Presbyterianism was established in Scotland in 1560 under the leadership of John Knox (see KNOX, JOHN), and in 1592 it was ratified by Parliament. Presbyterians were among the early New England colonists, and many of them settled about Boston and formed the majority of the colony of Massachusetts Bay. The first American presbytery was organized in 1707, the synod of Philadelphia was formed in 1716 and a general assembly was organized in 1788. The original church in the United States divided on the question of slavery just before the outbreak of the Civil War, and the United Synod of the Presbyterian Church South was organized. The Presbyterian Church of the Confederate States was also organized in 1861, and since the Civil War it has been known as the Presbyterian Church of the United States. It has a strong following in the South. The United Presbyterian Church of North America is distinguished by using only the Psalms in song. In 1873 the World's Alliance was formed among all branches to unify missionary work. There are about 2,257,000 Presbyterian communicants in the United States, and 1,115,000 in Canada. In the world as a whole the denomination has 9,000,000 members.

PRES'COTT, Ariz., the county seat of Yavapai County, 137 miles north of Phoenix, on the Atchison, Topeka & Santa Fe Railroad. The city is on an elevation of 5,340 feet, the plateau being larger than the state of Connecticut, in a rich mining country, producing gold, silver, tungsten and copper. Stock raising and lumbering are important industries. The city has a Carnegie Library, a courthouse, a Federal building, a Masonic Temple, Saint Mary's Hospital and Home for Children, Saint Mary's Sanitarium and Saint Joseph's Academy and the Home for Aged and Infirm Arizona Pioneers. Population, 1910, 5,092; in 1917, about 6,500.

PRESCOTT, William Hickling (1796–1859), an American historian of Spanish conquests in America, born at Salem, Mass. When he was graduated from Harvard College, at the age of twenty-one, he was nearly blind, having entirely lost the sight of one eye through accident and the partial loss of the other through overwork. With the aid of readers and secretaries he spent several years in literary research, in the course of which he published a number of essays. In 1837 he published his first history, *The Reign of Ferdinand and Isabella.* It was received with enthusiasm, both in America and Europe. It was rapidly translated into French, Spanish and German, and its author was elected a member of the Royal Academy at Madrid. Prescott's next work was the *History of the Conquest of Mexico, with a Preliminary View of the Ancient Mexican Civilization and the Life of the Conqueror, Hernando Cortes,* which appeared in 1843 and was received with an equal degree of favor. In 1847 he published the *History of the Conquest of Peru, with a Preliminary View of the Civilization of the Incas.* Eight years later the first two volumes of the long-expected *History of the Reign of Philip the Second, King of Spain,* appeared, and in 1858 a third volume was published; but before the work was completed, Prescott died from apoplexy, at his home in Boston, Mass.

WILLIAM H. PRESCOTT

Prescott ranks with Motley and Parkman as an American historian of first rank. Since his histories were written, American archaeological research has shown that the early chroniclers on whom Prescott depended for facts were unreliable; but in general the historian's accounts are accurate, and his style is highly entertaining.

PRESIDENT OF THE UNITED STATES. The Constitution declares that the law-executing department of the government shall be in the hands of a President of the United States, who shall be chosen by electors, and not elected directly by the people; his term of office was fixed at four years; he may legally succeed himself.

The system of electing the President and Vice-President is not clearly understood by many people. As a rule, we fail to see why it would not be right that every legal voter in the country should cast his vote directly for President and Vice-President. The plan adopted in the convention which framed the Constitution was the result of a compromise. One section demanded that the President be elected by Congress, and that in the selection the people directly should have no choice. Another faction desired to place the responsibility fully upon the people by direct vote. By the plan adopted, each state was empowered to choose by vote, a number of men equal to its total membership in Congress, and the men so chosen were to meet on the same day all over the United States in the various state capitals and there cast their votes directly for President and Vice-President. If a state has ten Representatives and two Senators, it is entitled to choose twelve electors of the President and Vice-President.

Nominations. The young men and young women of to-day have not failed to note that every four years representatives of the great political parties assemble in national convention and nominate men for the offices of President and Vice-President. About the same time in every state in the Union the people, either by direct vote or in state party conventions, name for each party as many electors of the President and Vice-President as the state has representation in Congress. When "Presidential election" day comes, on the first Tuesday after the first Monday in November, each qualified voter in the United States is entitled to vote with the party of his choice indirectly for President and Vice-President of the United States. However, if

he understands the Constitutional provision, he knows he does not vote directly for these high officers; he votes for the men (the electors) who in due time will elect the President and Vice-President. The next morning after election day the people all over the United States know the names of the next President and Vice-President, although as a matter of fact, these officers have not yet been chosen. If in any state the republican party casts the most votes, the republican electors are chosen; in democratic states the democratic electors are chosen.

Electoral College. On the second Monday in January following the date of the Presidential election, the electors who have been chosen in every state meet in the capitals of their states and proceed to vote by ballot for President and Vice-President of the United States. Details of the operation of the electoral college are given in an article on page 1195.

Election by the House. It is possible in any election of President and Vice-President that there is no choice in the electoral college. The Constitution prescribed that "the person having the greatest number of votes for President shall be the President, if such number be a majority of the whole number of electors." Now, to secure a majority of the electors one candidate must receive more votes than all the other candidates combined. If he is not thus fortunate, the vote of the electoral college is not decisive, and the election of President and Vice-President is then thrown on Congress. The Constitution prescribes that the House of Representatives shall then choose the President, and this is doubtless due to the fact that the House is nearer to the people than is the Senate. If the election of President thus falls upon the House of Representatives, it is provided that the vote in the House shall be taken by states, the entire representation from each state having only one vote. Therefore, the decision of the majority of Representatives from a state would control the single vote of that state for President. The election of Vice-President, in case there is no choice in the electoral college, falls to the duty of the Senate.

Twice in the history of the country the election of President and Vice-President has devolved upon Congress. In 1800 Jefferson and Burr received the same number of electoral votes and in the House of Representatives Jefferson was elected. In 1824 in the electoral college Jackson received 99 votes, Adams, 84, Crawford, 41, and Clay, 37. Jackson had a plurality of votes but lacked 32 of a majority. The House of Representatives elected Adams.

Succession to the Presidency. The Vice-President of the United States must have the same qualifications as the President, for upon the death, removal, or entire disability of the latter, the Vice-President assumes the position of President and retains it during the remainder of the term for which the President was originally elected. Previous to 1886 there was no provision for succession beyond the Vice-President; an embarrassing situation might have arisen had both the President and Vice-President died in office, or become disqualified. In the year named the Presidential Succession Law was passed, providing that after the Vice-President the Secretary of State should succeed to the Presidency, if he possessed the legal qualifications, and after him in turn, the Secretary of the Treasury, Secretary of War, Attorney-General, Postmaster-General, Secretary of the Navy and Secretary of the Interior. The Secretary of Agriculture, the Secretary of Commerce and the Secretary of Labor, later made members of the Cabinet, are not included in the succession.

Qualifications of the President. The Constitution declares that the President of the United States must be thirty-five years of age and a natural-born citizen, and that he must have resided within the country for fourteen years previous to his election. One of foreign birth can never attain to the Presidency; a citizen of the United States whose business has called him out of the country for a continued period is ineligible unless his absence has been in the discharge of duties connected with the government. One who is abroad in his country's service does not lose his residence here, but for all political and governmental purposes is considered as not having been out of the country.

Salary. The President of the United States at first received a salary of $25,000 per year. In 1873 it was doubled, but the law increasing it was coupled with an obnoxious proposition to increase the salaries of members of Congress from $5,000 to $7,500, which increase should date back to the beginning of the Congress about to expire. This act was called the Salary Grab; it was

Presidents of the United States

	BORN	NATIVE STATE	COLLEGE	OCCUPATION OR PROFESSION	POLITICAL PARTY	AGE AT INAUGU-RATION	SERVED	AGE AT DEATH	PLACE OF BURIAL
1. George Washington	1732	Virginia		Planter	Federalist	57	1789–1797	67	Mount Vernon, Va
2. John Adams	1735	Massachusetts	Harvard	Lawyer	Federalist	61	1797–1801	90	Quincy, Mass.
3. Thomas Jefferson	1743	Virginia	William and Mary	Planter	Republican*	57	1801–1809	83	Monticello, Va.
4. James Madison	1751	Virginia	Princeton	Lawyer	Republican*	57	1809–1817	85	Montpelier, Va.
5. James Monroe	1758	Virginia	William and Mary	Lawyer	Republican*	58	1817–1825	73	Richmond, Va.
6. John Quincy Adams	1767	Massachusetts	Harvard	Lawyer	Republican*	57	1825–1829	80	Quincy, Mass.
7. Andrew Jackson	1767	North Carolina		Lawyer	Democrat	61	1829–1837	78	Hermitage, Tenn.
8. Martin Van Buren	1782	New York		Lawyer	Democrat	54	1837–1841	79	Kinderhook, N.Y.
9. William H. Harrison	1773	Virginia	Hampden-Sidney	Farmer	Whig	68	1841 (1 mo.)	68	North Bend, Ohio
10. John Tyler	1790	Virginia	William and Mary	Lawyer	Democrat	51	1841–1845	71	Richmond, Va.
11. James K. Polk	1795	North Carolina	University of N.C.	Lawyer	Democrat	49	1845–1849	53	Nashville, Tenn.
12. Zachary Taylor	1784	Virginia		Soldier	Whig	64	1849–1850	65	Springfield, Ky.
13. Millard Fillmore	1800	New York		Lawyer	Whig	50	1850–1853	74	Buffalo, N. Y.
14. Franklin Pierce	1804	NewHampshire	Bowdoin	Lawyer	Democrat	48	1853–1857	64	Concord, N. H.
15. James Buchanan	1791	Pennsylvania	Dickinson	Lawyer	Democrat	65	1857–1861	77	Lancaster, Pa.
16. Abraham Lincoln	1809	Kentucky		Lawyer	Republican	52	1861–1865	56	Springfield, Ill.
17. Andrew Johnson	1808	North Carolina		Tailor	Republican	56	1865–1869	66	Greenville, Tenn.
18. Ulysses S. Grant	1822	Ohio	West Point	Soldier	Republican	46	1869–1877	63	New York City
19. Rutherford B. Hayes	1822	Ohio	Kenyon	Lawyer	Republican	54	1877–1881	70	Fremont, Ohio
20. James A. Garfield	1831	Ohio	Williams	Lawyer	Republican	49	1881(6½mo.)	49	Cleveland, Ohio
21. Chester A. Arthur	1830	Vermont	Union	Lawyer	Republican	50	1881–1885	56	Albany, N. Y.
22. Grover Cleveland	1837	New Jersey		Lawyer	Democrat	47	1885–1889	71	Princeton, N. J.
23 Benjamin Harrison	1833	Ohio	Miami	Lawyer	Republican	55	1889–1893	67	Indianapolis, Ind.
24. Grover Cleveland	1837	New Jersey		Lawyer	Democrat	55	1893–1897	71	Princeton, N. J.
25. William McKinley	1843	Ohio	Allegheny College	Lawyer	Republican	54	1897–1901	58	Canton, Ohio
26. Theodore Roosevelt	1858	New York	Harvard	Publicist	Republican	42	1901–1909	60	Oyster Bay, N. Y.
27. William H. Taft	1857	Ohio	Yale	Lawyer	Republican	51	1909–1913		
28. Woodrow Wilson	1856	Virginia	Princeton	Educator	Democrat	56	1913–1921		

*The Republican party of Jefferson, Madison and Monroe is now known as the Democratic party. Adams was nominally a Republican, but was in reality a Federalist.

Outline on the President

I. The Place of the President in the Government
II. Term of Office
  (a) Number of years
  (b) How often can he be re-elected?
III. Election
  (a) Nominating conventions
  (b) Direct primaries
  (c) Manner of election
    (1) By electors
    (2) By House of Representatives
IV. Qualifications
  (a) As to birth
  (b) Age
  (c) Residence
V. Vacancy in the Office
  (a) For what reason may the Presidency be vacated
  (b) How is a vacancy filled
VI. Salary
  (a) Amount
  (b) Record of changes in
VII. Oath of Office
VIII. Powers and Duties
  (a) Commander in chief of army and navy
  (b) Commander in chief of militia when in actual service
  (c) By and with consent of Senate appoints many government officials
  (d) Fill vacancies occurring during Senate recess
  (e) Grant reprieves and pardons, except in cases of impeachment
  (f) With the concurrence of the Senate make treaties
  (g) Convene either or both Houses of Congress, if occasion demands
  (h) Recommend such measures to Congress as he shall judge expedient
  (i) Receive ambassadors and public ministers
  (j) Faithfully executes the laws

repealed and the President's salary again reduced to $25,000. Soon afterwards, in a separate law, it was increased to $50,000, at which figure it remained until 1909, when it was fixed at $75,000 per year. An allowance of $25,000 a year for traveling expenses is made.

The President's Cabinet. See Cabinet.

PRESS, Liberty of the. See Liberty of the Press.

PRESSBURG, *pres'boorK,* Hungary, capital of the County of Pressburg, is situated on the north bank of the Danube amid the Carpathian Mountains, thirty-five miles east of Vienna. The site is picturesque, and Pressburg is one of the finest cities of Hungary. Spacious boulevards now occupy the space where formerly stood the old fortifications, and within the city are beautiful streets and squares, adorned with statuary and flowers. Among the historic structures of special interest are the old Gothic cathedral, dating from the eleventh century and restored in 1861–80, in which many of the kings of Hungary were crowned; the old castle, once the residence of the kings of Hungary, but now a ruin, and the townhall, dating from the thirteenth century and containing a valuable museum of Roman antiquities. Other interesting features are the Winter Palace, formerly the residence of the Primate of Hungary; the Landhaus, which was the seat of the Hungarian Diet until 1848, and the equestrian statue of Marie Theresa. The leading manufactures include dynamite, pastry, cabinet work, tobacco, ribbons, cloth, machinery, leather and chemicals. The city has a prosperous trade, principally in cattle, grain and wine. In 1541, when the Turks captured Buda, Pressburg became the capital of Hungary, and it held this position until 1784. The treaty by which Austria ceded Venice to France and the Tyrol to Bavaria was signed here in 1805. See Hungary. Population, 1910, 78,223.

PRESTON, Ont., in Waterloo County, on the Grand Trunk and Canadian Pacific railways; electric railways connect it with Kitchener, Galt, Paris and Brantford. The chief manufactures are agricultural implements, woodworking machinery, electric cars, metal shingles, piano players, stoves, woolen goods, furniture and shoes. The district produces live stock, grain and vegetables. Mineral springs make the town a popular resort. Population, 1916, about 4,200.

PRETO'RIA, TRANSVAAL, the administrative capital of the Union of South Africa, and capital of the province of the Transvaal, is situated on the Aapies River, forty-six miles by rail northeast of Johannesburg. It has broad streets lined with shade trees, and many substantial buildings. The most important structures are the former Parliament House, the government offices, the postoffice and the University College Library. The city was founded in 1855 and named for the Boer leader, Andries Pretorius. When the Union of South Africa was formed, Cape Town and Pretoria were rivals for the honor of becoming the capital. The contest was settled by making Pretoria the seat of adminstration, and Cape Town the seat of legislation. Population, 1911, 49,743, of whom 26,618 were whites.

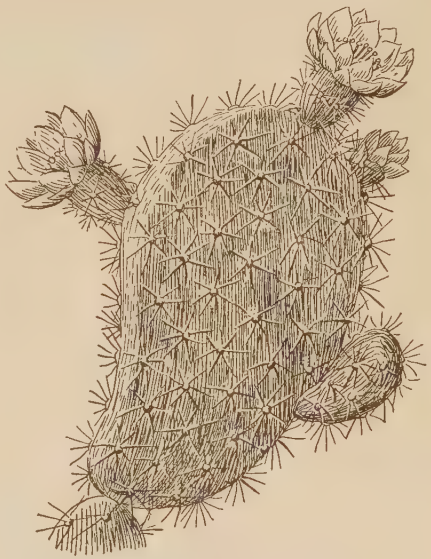
PREVAIL'ING WEST'ERLIES, the prevailing winds of the temperate zones. In the northern hemisphere these winds blow towards the southeast; in the southern hemisphere they have a northeasterly direction. South of the equator between the fortieth and sixtieth parallels, these winds attain such a tremendous velocity that sailors call them the "roaring forties." North of the equator, however, interrupted by the great land masses, especially by the mountains, and by cyclonic disturbances, they do not blow in a steady gale, and often they lose their identity altogether. However, when general weather conditions are normal one can almost always detect an eastward movement of the highest clouds, due to these winds. See WIND; TRADE WINDS.

PRI'AM, in Greek legend, the last king of Troy, the son of Laomedon. By his second wife, Hecuba, he had, according to Homer, nineteen children, among them Hector, Paris, Cassandra and Troilus. His name has been rendered famous by the tragic fate of his entire family, as a result of the Trojan War. Homer gives no account of the death of Priam, but other poets relate that he was slain by the son of Achilles when Troy fell into the hands of the Greeks. See TROY.

PRIBILOF, *pre'be lof*, **ISLANDS**, the home of the fur seal, a group of small volcanic islands on the coast of Alaska, in Bering Sea. They belong to the United States and are named for their discoverer. The islands are isolated and surrounded by fog, which doubtless is the reason the fur seal selects these grounds for breeding purposes. In 1868 the Pribilofs were made a fur-seal reservation. Because of the nature of the fur-seal industry, total abstinence of the people is required. Accordingly, in 1915 the government made the islands prohibition territory, and every kind of intoxicating liquor is prohibited.

PRICK'LY ASH, a group of North American shrubs and small trees belonging to the rue family. The leaves resemble those of the ash, the twigs bear prickles, and the bark has a stinging taste. The bark of one southern species is chewed by the negroes as a remedy for toothache, and the tree is locally known as *toothache tree*.

PRICKLY PEAR, or **INDIAN FIG**, a name given to an American genus of cacti containing about 150 different species, most of which grow in the southwestern part of the United States. The common prickly pear is a perennial and bears yearly, between June and October, beautiful, showy, solitary flowers, sometimes red or white, but usually yellow and about three inches in diameter.



PRICKLY PEAR
The cochineal cactus.

The stem is composed of flat, oval joints, which grow in zigzag formation and are leafless, but covered with sharp spines. Some species, as the Indian fig, found in dry, subtropical regions, where few other plants will grow, bear nutritious fruit.

This plant is an interesting example of adaptability to environment and of the law of survival of the fittest. In the desert re-

gion where vegetable food is scarce, wild animals would long ago have exterminated the plant if it had not so well protected itself against them with its armature of spines. Except for its spines the plant makes excellent fodder for cattle, and if cultivated it may be coaxed to cast off its weapons; indeed, Burbank has succeeded in producing a spineless variety which is of economic value. See CACTUS; COCHINEAL.

PRIDE'S PURGE. See RUMP PARLIAMENT.

PRIEST, in its most general signification, a man whose function is to inculcate and expound religious dogmas, to perform religious rites and to act as a mediator between worshippers and whatever being they worship. In some countries the priesthood has formed a special order, or caste, the office being hereditary; in other countries it has been elective. In sacred history the patriarchal order furnishes an example of the family priesthood. Abraham, Isaac and Jacob performed priestly acts and drew "near to the Lord," as did also Job, and the Arab sheikh to-day unites in his person the civil and religious headship. The Mosaic priesthood was the inheritance of the sons of Aaron, of the tribe of Levi. The order of the priests stood between the high priest and the Levites.

The priests of the Church of Rome are bound to a life of celibacy, but in the Greek Church they are allowed to marry. In the Roman Catholic hierarchy the priesthood, which includes many orders, has the lowest rank; in the Anglican and other Episcopal churches, the priests form the second order of clergy, bishops ranking first.

PRIMARY ELECTION, a method of election by which the voters are enabled to express their preference for the candidates for office in their respective political parties. In other words, the primary election is a *nominating* election. In order that a candidate may have his name placed on the ballot he must file a petition signed by a certain per cent of the voters of his party in the political unit over which the office has jurisdiction. If he is running for alderman, this unit is the ward which he is to represent in the city council; if he is candidate for county supervisor, the unit is the county.

According to the plan largely followed, at a primary election the voter is required to declare his political party. In that case the ballots are strictly party ballots, and the voter can vote for candidates only in his party. However, at the regular election he is free to vote for any candidate on the ticket, regardless of the party to which he belongs.

The primary election originated in the United States. At first it was restricted to local elections, but its scope has been extended until now state officers, Representatives in Congress, United States Senators and, in many states, Presidential electors are nominated at the primaries.

PRIMATES, *pri ma'tees*, the highest order of life in the animal kingdom. It includes man, apes, monkeys and lemurs, and is a division of the class mammalia.

Related Articles. Consult the following titles for additional information:

Ape	Gibbon	Man
Aye-aye	Gorilla	Monkey
Baboon	Lemur	Orang-utan
Chimpanzee	Mammals	Zoölogy

PRIMOGENITURE, *pri mo jen'e ture*, the right of the eldest son and those who derive through him to succeed to the property of an ancestor. The institution existed among the ancient Hebrews, but was particularly developed under the feudal system. It was introduced into England by the Normans, and that country remains to-day the only conspicuous example of its survival in Europe. The law of primogeniture was long ago abolished in the United States. According to it the eldest son is entitled by law to the whole of his deceased father's real estate. If the eldest son dies, his son succeeds to the land. If the whole male line is exhausted, the law becomes inoperative and all female heirs share equally—except in the case of the Crown, which always goes to the eldest. It is owing to the operation of this law that extensive English estates have remained undivided in certain families generation after generation.

PRIM'ROSE, a genus of plants comprising about 200 species, chiefly perennials, native to North America, Europe and Asia. The common European primrose, abundant in woods, meadows and hedges, has a short, upright stalk bearing both the leaves and the flowers, the former, small and cup-shaped, the latter pale yellow, each on a short separate stem. It is related to the cowslip, and from it many of the cultivated varieties have been developed. In the United States the primrose extensively cultivated is a Chinese variety. It is of different structure from the European primrose, having a thick cluster of large furry leaves growing close to the soil.

From the midst of these rise slender stems, bearing fragrant blossoms varying in color from delicate shades of pink to violet and

COMMON PRIMROSE

purple. These blossoms are sometimes single, and sometimes are in clusters. Several Japanese and other varieties are cultivated in gardens as ornamental plants.

PRINCE, literally, one who holds first place. In modern times the title of prince (or princess) is given to all sovereigns generally, as well as to their sons and daughters and nearest relations. In Germany under the empire there was a class of sovereigns who bore the title of prince, *Fürst*, as a specific designation; members of royal families were called *Prinzen*. On the Continent there are many ancient families not immediately connected with any reigning house, who bear the title of prince, while in England dukes and earls are sometimes called princes. The British heir apparent bears the title Prince of Wales.

PRINCE ALBERT, Sask., on the Canadian Northern, Canadian Pacific and Grand Trunk railroads, and on the North Saskatchewan River, eighty miles north of Saskatoon. There is a Roman Catholic cathedral, an Anglican pro-cathedral, a separate school, a collegiate institute, a hospital, an armory and a permanent land show building. The city is in a beautiful country, especially suited to spring wheat and oats, but also known for fishing and shooting. Three large lumber companies here cut about 100,000,000 board feet a year. Other large industrial plants include brick plants, three flour mills, a cold storage plant, planing mills, marble and granite works, and saddlery factory. Prince Albert is the headquarters of a judicial district and of the Royal Northwest Mounted Police for Central and Northern Saskatchewan, and is the seat of the provincial jail and penitentiary. Population, 1916, 6,450.

PRINCE EDWARD ISLAND, an island forming the smallest province of the Dominion of Canada, is located in the Gulf of Saint Lawrence and separated by Northumberland Strait from New Brunswick, on the east, and Nova Scotia, on the south. Its greatest length, from east to west, is about 145 miles; its breadth varies from four to thirty-four miles, and its area is 2,184 square miles. The coast line presents a remarkable succession of large bays and projecting head lands. The surface undulates gently, nowhere rising so high as to become mountainous, or sinking so low as to form a monotonous flat. The island is naturally divided into three peninsulas, and the whole is well suited for agriculture and pasturing, the forests now being of comparatively limited extent. The prevailing rock is a reddish sandstone, but a large part of the surface is evidently alluvial. The climate is mild, and there is abundant moisture for vegetation.

Practically all of the soil except that of a few marshes along the coast is suitable for

COAT OF ARMS OF PRINCE EDWARD ISLAND

The lion, as in several other provinces, is used as the emblem of British sovereignty. The large oak and the three saplings stand on an island, representing the province. The three saplings represent the three counties into which the province is divided. When properly coloured the lion is gold, on a red background: the tree and the island are green, on a white or silver background.

cultivation, but in some localities it became nearly exhausted before the farmers began to use fertilizer. The fertilizer now in general use is "mussel mud," which is dredged from

the river beds and bays of the island. Agriculture is the chief occupation, and the leading crops are oats, potatoes and turnips. Some wheat is raised and dairy husbandry is increasing in importance. Cattle, hogs and sheep are raised in considerable numbers, but horses constitute about two-thirds of the live stock.

Prince Edward Island has the distinction of originating fur farming, which has been extended to every province of Canada, now the leading fur-farming country of the world (see FUR AND FUR TRADE). The first experimental farm was started in 1887. The industry centers around the silver black fox. On January 1, 1918, there were 11,000 of these foxes on ranches in the island, and 3,500 pups were born during the year. In 1913 silver black foxes for breeding purposes sold at $12,000 to $17,000 a pair. The temperature and humidity of the island produce fine, thick fur, and fox farming has become one of the valuable industries.

The fisheries give employment to about 6,000 men, and the annual catch is valued at $1,000,000 to $1,500,000. About sixty per cent of the catch are lobsters; cod, herring, oysters, smelts and mackerel are the other fish of importance.

The manufactures are chiefly confined to linen and flannels for domestic use. The exports consist of timber, agricultural produce and live stock, and the imports include dry goods, hardware, cordage and iron.

A railway runs from one end of the island to the other. The capital is Charlottetown (which see). The public affairs of the island are administered by a lieutenant-governor, nominated by the Crown, who appoints an executive council of nine members. There is also a legislative assembly of a single house, elected by the people. There is an excellent educational system, the elementary schools being free. The island is supposed to have been discovered by Cabot in 1497. It was first colonized by France, was captured by the British in 1745, was restored and recaptured and finally in 1873 it was admitted to the Dominion of Canada. The inhabitants are almost all of English descent. Population, 1911, 93,728.

PRINCE OF WALES. See WALES, PRINCE OF.

PRINCE RUPERT, B. C., on Kaien Island, 550 miles north of Vancouver. It is the western terminus of the Grand Trunk Pacific Railway and has direct steamship communication with foreign ports; the Canadian Pacific also reaches the town. It is 400 miles nearer Japan than is any other Pacific port, is located on an excellent harbor, east of the Queen Charlotte Islands, and south of the most southern point of Alaska. The surrounding country has unlimited agricultural, mineral and forest resources, and the bay and nearby rivers abound in fish; extensive fishing industries are established.

Before lots were offered for sale the city was laid out and grades established by engineers acting conjointly with the government and the railway company; the first lot was sold in May, 1909. Immense cold storage and fish-curing plants, creameries and a large sash and door factory are worthy of mention. Population, 1916, 6,500.

PRINCE'TON, BATTLE OF, an important battle of the Revolutionary War, fought January 3, 1777, at Princeton, N. J. On January 2, Cornwallis occupied a position on the west bank of the Assunpink River, opposite an inferior American force under Washington. Washington evaded battle by moving his whole army about Cornwallis's position to the northward, leaving a few men to keep his camp fires burning and make noises to deceive the British commanders. He soon met a force of about 2,000, coming from Princeton to join Cornwallis. After a hard battle the British were routed and Washington took up a strong position at Morristown, while Cornwallis retreated northward through New Brunswick to New York, thus practically abandoning the state of New Jersey.

PRINCETON, N. J., in Mercer County, fifty miles southwest of New York City and ten miles nearly north of Trenton, is on the Pennsylvania Railroad and the Delaware & Raritan Canal. It is not a manufacturing town, but is famous as a great educational center, the home of Princeton University (which see). Its streets are beautifully shaded, and there are many fine colonial mansions. The place was settled about 1696, and was named Princeton in 1724. Here, on January 3, 1777, occurred the Battle of Princeton (see PRINCETON, BATTLE OF), an audacious and successful venture of General Washington. Population, 1915, 5,678.

PRINCETON UNIVERSITY, a university located at Princeton, N. J., founded by the

Presbyterian Synod of New York in 1746 as the College of New Jersey. The school was originally established at Elizabethtown. In 1748 it was moved to Newark, where it remained until its permanent location at Princeton. On the one hundred fiftieth anniversary of its founding, the college of New Jersey became Princeton University. As now organized, the university has scientific and academic courses of study, requiring four years for completion, and graduate courses, which constitute the university work in all departments. It maintains laboratories, astronomical observatories, and museums of geology and archaeology, biology, morphology and historic art. The general library contains over 354,000 volumes, and there are special libraries connected with the laboratories. The faculty numbers about 200, and the enrollment is over 1,600. The endowment is about $5,400,000. While nonsectarian, this school is conducted under the auspices of the Presbyterian Church, under which it has acquired a leading influence. Many notable men have been associated with it, including two United States Presidents—Grover Cleveland, a lecturer and trustee for ten years, and Woodrow Wilson, its president from 1902 to 1910.

PRINTING, the art of stamping letters, figures or other characters upon paper, cloth or other material. In its ordinary sense the term means the impressing of characters upon paper.

Processes. Printing includes the three processes of composition, makeup, or imposition, and press work. As the first is now practiced it is necessary to add to these, sterotyping and electrotyping, each of which is described under its appropriate title.

Composition. The first step in printing consists in setting the type, or *composition.* Formerly all type was set by hand, but now only in certain kinds of display printing and in small country offices is any type set in this way. Instead of the old-time compositor and his case the linotype and the monotype are employed. As the type comes from the machines it is arranged in galleys and proofs are taken for correction.

Make-up, or Imposition. This process includes arranging the type into pages, putting in the head lines, page numbers and running titles. It is done on a stone or on an iron-topped table, and the workman who does it is known as the *stoneman.* When made into pages, the type is placed in an iron frame, called the *chase,* and is wedged in so tightly that the single types cannot fall out when the chase is moved. The chase and type, when arranged for printing, constitute the *form.* The size of the form varies from 1 page to 128 pages, according to the size of the page and the work. The most common sizes contain 16 or 32 pages. The pages are so arranged that the right numbers will face when the sheet is folded. Only small editions of papers and circulars are now printed directly from type. All others are printed from stereotype or electrotype plates, and when this is done the type, as soon as made into pages, is sent directly to the foundry. The plates are then placed in the form.

Presswork. The actual printing is done on the printing-press, which is a machine for pressing the paper down upon the face of the type. The type is inked by running rollers over the form just before the paper is pressed down upon it. The paper is fed into the press in single sheets or from a roll, according to the plan of the press and the kind of printing. Circulars, books, pamphlets and country newspapers are printed from sheets, but large newspapers and magazines which have a large circulation, are printed from a roll. As the roll is printed it is cut into sheets, which are folded by a machine. The modern newspaper and magazine presses do this work very rapidly, some of them having a capacity of 150,000 copies of twelve-page papers per hour. Circulars, job work and most country papers are printed on small presses that may be run by power or by hand, as desired.

Color Printing. Printing-presses are constructed which will print in three or more colors, and by their use inexpensive colored pictures are produced. Many of the large city dailies now have one section of their press fitted for color work, and on this the colored supplements and covers of the Sunday edition are printed.

Color printing of this sort is not very satisfactory, since the pictures produced are more or less crude. In periodicals of a high grade and in books, we find, however, exquisite colored pictures. These are made by what is known as the *three-color* and the *four-color* process. In the three-color process three colors—red, blue and yellow—are printed over each other, and in the four-color process black is added. These colors so overlap as to produce the variety of tints necessary to complete the picture. Color print-

ing of this sort requires a high degree of skill, for each color must exactly overlie the others; the variation of the slightest fraction of an inch will mar and may ruin the picture. The color prints in the New Practical Reference Library are made by the color process.

History. The origin of printing is unknown. It is probable that the Egyptians and Babylonians engraved characters on precious stones, which were set in rings or other jewels and used for the purpose of impressing their signatures upon official documents. Some assert that the Romans knew the art of printing, but would not use it because the authorities believed that the spreading of intelligence would lead to uprisings among the people. As far as definitely known, however, the first printing was done by the Chinese during the last century before the Christian Era. These people used engraved blocks, instead of type, and they still continue to print by this method. There has been a great deal of dispute over the invention of printing with movable type as we know it to-day. The Germans claim that Johannes Gutenberg was the inventor, while the Dutch assert that this honor is due to Laurens Coster of Holland. The weight of evidence seems to be in favor of Gutenberg, and he is now generally considered to have been the inventor, since he was the first to establish printing on anything like a scientific basis.

The exact date of the invention of printing is not known, but it occurred sometime between 1424 and 1448. Gutenberg's printing office was at Mainz, Germany, and the first book printed was a copy of the Old Testament, which was completed between 1450 and 1455. This work is now known as the Mazarin Bible, but it is not known whether it was printed by Gutenberg or by Faust, or by the two in partnership. After Gutenberg's death the work was continued by John Faust, who kept the process secret until Mainz was captured in a war and the workmen were obliged to flee. These printers soon set up establishments in other cities, and by the end of the fifteenth century there was a printing office in nearly every important city of Europe. Printing was introduced into England by William Caxton in 1477.

The first printing press in America was set up in the City of Mexico sometime between 1540 and 1550. The first press in the United States was established at Harvard College, Cambridge, Mass., in 1638. This press is of great historic interest. The first article printed on it was the *Freeman's Oath,* the second was an almanac and the third was the first edition of John Eliot's famous *Indian Bible.* This was also the beginning of what is now the University Press, one of the largest and best-known printing establishments in the world. Presses in other colonies followed, and within the next hundred years each had one or more printing establishments. After the Revolutionary War the printing industry in the United States started anew, and it has continued to keep pace with the growth of the country.

Related Articles. Consult the following titles for additional information:

Book	Gutenberg	Newspaper
Bookbinding	Linotype	Printing Press
Caxton	Lithography	Stereotyping
Electrotyping	Monotype	Type

The Gutenberg Press

PRINTING PRESS, a machine for printing upon paper or other material. The necessary parts of a printing press are the *bed,* for holding the type form; a device for inking the type; a *platen,* for pressing the paper upon the type; the frame for holding these parts, and the necessary gear for operating them.

The first printing press was a modification of the wine press and was a very crude affair, consisting of a bed, upon which the forms were placed; a board for a platen, and a screw, for pressing the platen down upon the type. The frame was of wood and rudely constructed. The type was inked with a leather ball, stuffed with wool. The paper was then laid upon the form and a platen placed over it, after which the form was shoved under the screw, which was turned with a lever. This was the press designed by Gutenberg and used for several centuries with little or no improvement. The first improvement in Gutenberg's press consisted in substituting iron for wood in making the frame; the next was in adding a spring to lift the platen when the screw was released, and the next, and by far the most important, in substituting a lever for the screw in operating the platen. Inking devices and the crank and pulley arrangement for moving the form were added.

The Cylinder Press. The cylinder press was the next great improvement in the printing press. It was invented by Friedrich Koenig in 1806 and was first used in 1814 in printing the London *Times*. This press takes its name from the large cylinder which constitutes the platen. As it revolves this cylinder seizes the paper and impresses it upon the type. The form is placed on a movable bed, so that it moves back and forth under the platen and the ink rollers at each impression. A good press of this pattern will make from 1,500 to 2,000 impressions per hour. The old-style cylinder press is a common object in all country printing offices.

The Newspaper Press. The most recent development in the printing press is in the invention and perfection of what is known as the web perfecting press, invented by Mr. Richard Hoe of New York in 1871. In presses of this pattern the forms are cylinders, and the stereotype plates are made in half-cylinders and clamped in position on the press. These cylinders are so placed that they print both sides of the sheet at once, and also print the paper from a roll, or web. The press is so planned that any number of parts can be added, so that a quadruple, a sextuple or an octuple press can be constructed as desired. These additions are made either by setting the presses side by side, or by placing one above the other, which is the more common plan. The work of one of these presses is so rapid that it is impossible for the untrained observer to follow the paper as it rushes through the machine. The double-octuple press used in printing the largest newspapers prints from eight rolls of paper, each roll containing five miles of paper and double the width of the ordinary newspaper. This press prints, cuts, folds and delivers in quires, 26,000 copies an hour of a paper containing thirty-two pages. (See NEWSPAPER, subhead *Printing*).

While the web perfecting press was constructed for the purpose of printing large daily papers, it has since led to the construction of other patterns for the use of large magazine and book establishments, and now some of the best work in the country is produced on presses of this pattern. See PRINTING.

PRISM, *priz'm,* a geometric solid, two of whose faces, called *bases,* are equal parallel polygons, and whose other faces, called *lateral faces,* are parallelograms. When the edges of the lateral faces are perpendicular to the bases, the prism is a *right prism;* otherwise it is *oblique.* The area of the surface of a prism is equal to the perimeter of the base (that is, the sum of the length of its sides) multiplied by the altitude (that is, the perpendicular distance between the two bases). The volume is equal to the area of one base multiplied by the altitude. In optics, the prism is a transparent body, usually glass, with two plane faces not parallel to each other.

PRISON, *priz'n,* a penitentiary under the management of a state, provincial or national government, for the confinement of adults, male and female, who have committed serious offenses against society, and who have been sentenced for periods varying from one year to the remainder of their lives. Jails are local institutions for the confinement for short terms of those who have committed minor offenses, and those held for trial. In jails the short-term prisoners are kept in idleness, but in prisons labor is provided.

Management. Every penitentiary is under the management of a *warden,* who is appointed by the governor, or by a board of prison commissioners. Under the warden are deputy wardens, superintendents, a chaplain and guards. Since the warden determines in a large measure the policy of the prison, he should be a man with special aptitude and training for his position, and his assistants should be in perfect harmony with him in carrying out whatever policy he may adopt.

The best results are obtained when the discipline is strict, but kind. While the first purpose of confining the prisoner is to punish him for his crime, the state should never lose sight of the fact that he is a man who may be reformed and made a useful citizen. Unjust or harsh treatment works against reform.

Construction and Equipment. Every prison contains offices, workshops and a large number of cell rooms, constructed of iron or concrete, and arranged in tiers, one above another. In these cells the prisoners are confined when not at work or engaged in some form of recreation. The buildings are enclosed with a high wall, on the top of which armed guards are maintained day and night. The wall usually incloses sufficient ground to give the prisoners opportunity for exercise in the open air. The workshops are equipped for whatever occupations are carried on. So far as possible each prisoner is assigned to

the trade he has worked at on the "outside." All are required to work, but for a serious breach of discipline a prisoner may be punished by being placed in solitary confinement, without labor, for a specified period.

In some states, prisoners are allowed a small wage, and in some they are allowed to work after regular hours at private tasks and earn money. All earnings are held by the warden and credited to the prisoners, or they are sent to the families or other relatives, as the prisoner requests. In many prisons the convict labor system is in force.

A good library is provided; there are chapel exercises on Sunday, and occasional entertainments are given. The prison *chaplain* may exert a greater influence over the men than any other official connected with the institution.

Prison Reform. Since the beginning of the nineteenth century much has been done to improve the condition of prisoners. Juvenile offenders are no longer confined with old and hardened criminals, but are sent to industrial schools or reformatories. The sanitary conditions of most prisons have been greatly improved, and methods of discipline have become more humane. Some institutions have been very successful in leading prisoners to reform, the most notable among these being the Elmira Reformatory, at Elmira, N. Y., opened in 1877, for the treatment of first offenders under thirty years of age. The principal features of the Elmira system, which have been largely adopted elsewhere, are indeterminate sentences, the classification of prisoners into three classes under the mark system, and discharge on probation, under supervision.

In most prisons those prisoners whose conduct is satisfactory are granted greater freedom of movement, and more general conversational privileges. Such prisoners are called *trusties,* and are put upon their honor. Some prisons have large farms on which trusted prisoners are sent to work under supervision; prison camps to which trusted prisoners are sent for constructing roads, under a very small guard, have proved successful. The confidence placed in these prisoners is seldom betrayed.

Related Articles. Consult the following titles for additional information:
Convict Labor
Crime and Criminology
Indeterminate Sentence
Juvenile Court
Parole
Sociology

PRISONERS OF WAR, soldiers or men of the navy captured from the enemy in time of war. In ancient times prisoners of war became the slaves of their captors. According to the convention of the peace conference held at The Hague in 1907, prisoners of war are declared merely in the custody of the nation which captures them, and while confined are to be treated as well as its own soldiers. Surgeons, chaplains and hospital attendants of the Red Cross are exempt from capture as prisoners of war. Prisoners of war are obliged to make themselves useful, and are protected by rules of international law against unlawful acts against their persons. In the World War many stories were current as to inhuman treatment of prisoners in Teuton prison camps, and there was more suffering among the captives than ever before recorded in the annals of warfare.

PRIVATEER, *pri va teer'.* Formerly it was customary for the government of a nation at war to engage and arm privately-owned vessels of a neutral country to prey upon the ocean commerce of its enemy. Such a vessel was called a *privateer,* and the commission under which it operated was known as a *letter of marque.* The practice of privateering led to much abuse, and there were many non-commissioned ship owners among neutrals who, taking advantage of a war situation, preyed upon the merchant ships of either or both belligerents as opportunity offered, thus engaging in high-seas robbery and piracy. Therefore, by the declaration of Paris, in 1856, the great European powers agreed to abandon the practice of employing privateers. The United States was not a signatory to the document, but its position in subsequent wars has been in accord with the decision of the convention.

PRIV'Y COUNCIL, originally the council of state of the British sovereign, convened to discuss matters connected with the public service and for the honor and safety of the realm. As it exists at present, the number of members of the Privy Council is indefinite; they are nominated by the sovereign at pleasure. The list of Privy councilors now embraces besides the members of the royal family and the members of the Cabinet, the archbishops and the bishop of London, the great officers of state, the Lord Chancellor and chief judges, the Speaker of the House of Commons, the commander in chief and some other persons. Officially at the head is the Lord

President of the Council, who is appointed by patent, and who manages the debates and reports them to the sovereign. See ENGLAND, subhead *Government.*

In Canada. Britain's overseas dominions copied the mother country's governmental devices in many respects. One of these was the adoption of the Privy Council. The British North America Act provides that the Council, which aids and advises the Governor-General, shall be known as the "King's Privy Council for Canada." As in England, the terms "Cabinet," "Ministry," "Administration" and "Government" are popularly applied to those members of the Council who are at the head of affairs for the time being. It should be understood that Privy councillors, even when no longer Ministers, retain honorary rank. When the Governor-General appoints his advisers, he first determines who shall be Premier; with the Premier's assistance the other Ministers are then chosen. The number of members of the Cabinet varies from fifteen to eighteen or twenty heads of departments and three "Ministers without portfolio" (that is, without departments) besides the President of the Privy Council. Ministers in charge of departments receive a salary of $7,000 a year; the president of the council receives $12,000. The permanent head of each department is a deputy-minister, appointed by the Crown and holding office regardless of political affiliations.

PRIVY SEAL, an official seal which formerly was affixed to public documents in Great Britain. It was a prerequisite of the Great Seal, and was used on documents of minor importance which did not require the Great Seal. Although the use of the privy seal was discontinued in 1884, the office of custodian still exists with the title Lord Privy Seal. The incumbent ranks as the fifth great officer in the state, and usually has a seat in the Cabinet.

PRIZE FIGHTING, fighting with the fists, with or without gloves, in public for prize money. The chief difference between a prize fight and a sparring or boxing match is that in a prize fight the participants intend to knock each other out for a reward, while in a sparring match there is no such intention, and no prize is offered. The prize fight is a relic of the past ages. It was common among the Greeks and Romans, and professional fighters were common in England through the Middle Ages. Modern prize fighting is conducted according to the rules for boxing. In the United States it is generally considered a brutal sport, and in most states it is forbidden by law. See BOXING.

PRO'BATE, the proof before the proper court that an instrument offered to be recorded is the last will and testament of the deceased person whose act it is alleged to be. The party presenting and upholding the instrument is termed the *proponent,* and the party disputing, if any, the *contestant.* In the United States, generally speaking, proofs cannot be taken until notice has been issued by the judges to all the parties interested to attend. On the return of the notice, the witnesses are examined and the trial proceeds before the court. If the judge, when both parties have been heard, decides in favor of the will, he admits it to *probate;* if against the will, he rejects it and pronounces the sentence of *intestacy.* The functions of this branch of the judiciary are confined to deciding on the authenticity of wills and upon the proper persons to act as administrators when no will exists or when no executors are named. In most states and in the Canadian provinces special courts called *probate* or *surrogate* courts are maintained for the purpose of settling estates. See WILL.

PROCE'DURE, in law, the method of proceeding in a lawsuit throughout its various stages, civil procedure being the rules for conducting a suit in civil law, and criminal procedure being the rules for conducting a criminal case.

In the United States, when redress is sought for a civil injury, the injured party brings an *action* against the offender, who thereby becomes the *defendant,* the complainant being known as the *plaintiff.* The action is begun by issuing a *writ of summons,* commanding the defendant to *appear* in court. If he fail to do so, an *appearance* is entered for him by the plaintiff. When both parties have entered an appearance they are said to be *in court,* and the suit may be commenced. The next stage is the *pleadings,* or the statements in legal form of the position of the two parties to the suit. Next the *issue* is argued. This may be a matter of law, the facts being admitted, in which case it is called a *demurrer,* or it may be a question of fact. In the former case the decision rests with the *judge;* in the latter, with the *jury.* In a jury trial, after the evidence has been submitted, the judge sums up the law bearing

upon the issue, the jury retires, enters a *verdict,* that is, comes to a conclusion, and the judge then pronounces *judgment,* that is, announces the decision and the consequences which the court has fixed to the act.

In criminal cases the first step is the *arrest* of the one charged with the crime; that is, he is taken into custody of the law. He is then brought before a judge or magistrate to be *examined,* and he may be held to answer for his action to the grand jury, or he may be dismissed for lack of evidence; if the evidence warrants it the grand jury brings in an *indictment,* and the accused is held for *trial* before a *petit jury.*

Pending trial, he is either allowed his freedom upon giving *bail,* or *bond,* for his appearance, or he is committed to jail. If the grand jury enters indictment, the prisoner is held for trial before a petit jury; if found not guilty, he is discharged; if found guilty, he is sentenced to punishment. In the latter case an *appeal* may be granted, that is, the right of a defeated party to carry his case to a higher court for determination, on account of a flaw in the conduct of the case at the earlier trial.

Related Articles. Consult the following titles for additional information:

Appeal	Demurrer
Arrest	Jury and Trial
Bail	by Jury
Court	Writ

PROC'TER, ADELAIDE ANNE (1825–1864), an English poet, born in London. Assuming the name of Mary Berwick, she became a contributor in 1853 to *Household Words.* This periodical was edited by Charles Dickens, who became interested in the young poet and aided her in gaining public recognition. Later poems were published in *All the Year Round.* A collection of her verses, nearly all of which had appeared in these two magazines, was issued in 1858. A later edition of them contains her biography, written by Dickens. Her best known poem, *The Lost Chord,* has been set to music.

PROCTOR, RICHARD ANTHONY (1837–1888), an English astronomer, one of the first scientists to adopt a simple style of exposition in writing for the general public. After graduating from Saint John's College, Cambridge, he began to devote himself to astronomy as a profession. He contributed numerous articles to magazines, including *The Popular Science Review,* and he edited the *Proceedings* of the Royal Astronomical Society. He was for years a popular lecturer on astronomy in England and America. In 1881 he settled in the United States, where he remained the rest of his life. Among his books are *Saturn and His System, Half Hours with a Telescope, Other Worlds than Ours, The Romance of Astronomy, Hereditary Traits, The Great Pyramid* and *Nature Studies.*

PROFIT SHARING, a system of compensation by which employes are given a share in the profits of a firm in addition to their regular wage. The additional payment may be in cash, paid at stated periods, as at the end of the year; it may be in shares of stock in the company; or in the form of an insurance fund, from which the workman derives a pension in his old age, or his family a cash payment in case of his death. Of all these plans the dividend shared by both employer and employe seems to be the most satisfactory.

The first record of profit sharing is that of Le Claire, a house painter in Paris, who began his experiment in 1842. Le Claire found that his plan led to increasing the incomes of both employer and employe, through the better quality and greater amount of work accomplished. The success of Le Claire's experiment led to the adoption of similar plans by other firms, and profit sharing has become quite common in France, England and the United States. Among the American firms that have become noted for their success in profit sharing are Proctor and Gamble of Cincinnati, the United States Steel Corporation, and the Ford Motor Works.

The advocates of the plan claim that it offers the following advantages:

1. It insures justice for both capital and labor.
2. It increases the efficiency of the workmen.
3. It decreases waste.
4. It lessens industrial unrest by harmonizing the interests of employers and employees.

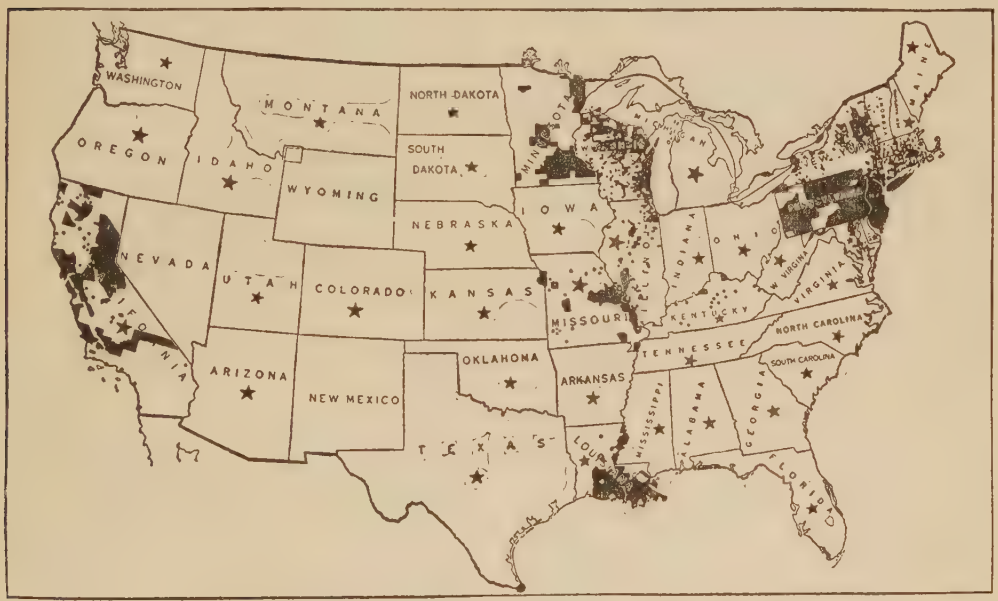
Labor unions, on the other hand, look upon profit sharing as only a substitute for real reform, claiming that it stimulates the workmen to greater production without giving them an equitable portion of the results. Some of them also look upon it as philanthropy and much prefer that a higher wage be paid outright.

PROGRES'SION, in mathematics, a regular increase or decrease in a series of numbers due to a common difference, or to the application of a constant law. The first of

these definitions applies to *arithmetical progression,* an example of which is 2, 4, 6, 8, 10, the increment being 2. The second refers to *geometrical progression,* for example, 2, 4, 8, 16, 32, 64, in which the series progresses in a constant ratio, the constant multiplier being 2.

PROGRESSIVE PARTY. See POLITICAL PARTIES IN THE UNITED STATES.

PROHIBITION, the name applied generally to one of the greatest moral and economic movements of modern times. Prohibition has come to mean, specifically, abolition by law of the privilege of manufacturing and selling alcoholic beverages. It is the direct result of the many serious abuses connected with the sale of whisky, wine, beer and similar beverages. The liquor traffic has been attacked from the standpoint of religion, morality, health and economics, and in North America at least it is rapidly being outlawed.



PROHIBITION AT THE TIME OF THE AMENDMENT

The states in white had already adopted state-wide prohibition. The black areas in otherwise white states represent saloon areas, the remainder of such states being under prohibition. The first thirty-seven states to ratify the amendment, thirty-six being necessary, are marked by stars. The District of Columbia, Alaska, the Canal Zone, Porto Rico, Hawaii and the Virgin Islands were also prohibition territory before the passage of the amendment.

Prohibition in the United States. In the American republic the abolition of slavery was the paramount moral issue of the period before and during the Civil War. Since the war the crusade against liquor has held first place in public interest. Maine, passing a law which became effective in 1851, was the first state in the Union to establish prohibition as a permanent state policy. At the close of the Civil War it was the only "dry" state, but within a decade the national movement to make liquor selling illegal began to take form. In 1872 the first national convention of the Prohibition party was held, and two years later the Woman's Christian Temperance Union was organized. These organizations did not wield much political influence, but they were excellent channels for propaganda against drink. A society which has secured direct results through political action is the Anti-Saloon League, organized in 1893. It has worked on a non-partisan basis, and for town or county local option as well as for state and national prohibition.

After 1880 prohibitory laws began to be passed in the Middle West, and early in the new century the tide definitely turned against liquor. The situation at the beginning of 1919 is shown by the accompanying map. The friends of prohibition also pressed their cause in the national Congress, and in August, 1917, the Senate passed a resolution to submit to the states for ratification a Constitutional amendment (the eighteenth) making the United States "dry" territory. In Decem-

ber the House concurred in this action, though slightly modifying the Senate resolution. The joint resolution, as adopted by both houses, is as follows:

Section 1. After one year from the ratification of this article the manufacture, sale or transportation of intoxicating liquors within, the importation thereof into, or the exportation thereof from the United States and all territory subject to the jurisdiction thereof for beverage purposes is hereby prohibited.

Section 2. The Congress and the several states shall have concurrent power to enforce this article by appropriate legislation.

Section 3. This article shall be inoperative unless it shall have been ratified as an amendment to the constitution by the legislatures of the several states, as provided in the constitution, within seven years from the date of the submission hereof to the states by the Congress.

As the required number of state legislatures had ratified the amendment by January, 1919, the Acting Secretary of State signed a proclamation on January 29 formally declaring the Eighteenth Amendment to the Constitution effective January 16, 1920.

During America's participation in the World War the manufacture of whisky was discontinued, and on November 21, 1918, President Wilson signed a food-production stimulation bill containing a rider making the country entirely "dry" after June 30, 1919. It was specified that this condition should continue until demobilization of the army was completed. In his first message to the Sixty-sixth Congress (May, 1919), the President recommended that legislation be passed repealing the bill in so far as it applied to beer and wine, but the sentiment in Congress was against this recommendation. Prohibition had already become effective in Alaska, Porto Rico, Hawaii and the District of Columbia, by special laws.

Prohibition Elsewhere. Liquor consumption was curtailed in Europe during the war because of the shortage of foodstuffs, but in practically all European countries the drinking of beer and wine is common. However, liquors are sold under restrictions, and there is in most sections a growing prohibition sentiment. Early in the war the czar of Russia prohibited the sale of vodka, the national drink of the Russians. After the revolution reports as to drinking conditions varied, but it was evident that Russia would never go back to the period of unrestricted drinking. During the war all of the Canadian provinces except Quebec adopted temporary prohibition; after the war referendums were to be taken in the separate provinces on the question of maintaining the reform.

PROHIBITION PARTY. See POLITICAL PARTIES IN THE UNITED STATES.

PROMETHEUS, *pro mē'thuse,* in Greek mythology, one of the Titans, brother of Atlas and Epimetheus and father of Deucalion. His name means *forethought,* as that of Epimetheus signifies *afterthought.* He wanted to bestow some great gift on man, and stole fire from heaven and brought it to earth, thus rousing the anger of Jupiter, who to punish him had Prometheus chained to a rock. Here an eagle came every day and devoured his liver, which during the night grew again. This torture Prometheus endured for centuries, until he was set free by Hercules.

PROM'ISSORY NOTE, a written promise to pay a certain sum of money, either on demand or at a future fixed or determinable time. If it is payable to the order of a person or to bearer, it is negotiable. The following is the most common form of a negotiable promissory note:

$500 CHICAGO, ILL., March 9, 1919.

Sixty days after date I promise to pay C. D., or order, five hundred dollars, with interest at the rate of six per cent per annum, for value received. A. B.

This note will be negotiable when endorsed by C. D. If it is sold or transferred without his endorsement, the person to whom it is transferred accepts only such rights in it as C. D. possesses. The one who makes the promise is the *maker* of the note, the one to whom the promise is made is the *payee.* See NEGOTIABLE INSTRUMENTS.

PRONG'HORN, a beautiful little American animal about the size of a goat and shaped like a deer. The adult is four and a half feet long and three feet high. Its hair is yellowish-brown above and white beneath; the cheeks are light; the rest of the head, which is gazellelike in shape, is dark. The conical horns, about a foot long, are covered with a sheath, which is shed annually. The animal is timid and suspicious and very fleet-footed, outrunning the swiftest hounds. Its flesh is a rare table delicacy. Formerly large herds of pronghorn ranged the western plains from the Saskatchewan River into Mexico, but the animals are now very rare. Wherever they are found they are known incorrectly as

antelope. A pronghorn reservation in Canada, known as the Maple Creek Reserve, is maintained by the Dominion government.

PRO'NOUN, in grammar, the part of speech that represents a noun, which is its *antecedent*. The pronouns in commonest use are of the following classes: *personal*, I, thou, you, he, she, it, with their various case and number forms; *conjunctive*, or *relative*, who, which, what and that; *interrogative*, who, which and what; *indefinite*, some, any, much and the like; and *demonstrative*, this, these, that, those.

PROOF AND PROOF READING. In printing, *proof* is a rough impression taken from the type for the purpose of correcting errors which appear in the composition. In printing books and periodicals of a high class, revised proofs are taken so that the author may be sure that all errors have been corrected.

Proof Reading. The corrections to be made on a proof of printed matter are marked on the margin; and for this purpose various signs or symbols have been universally adopted. The following specimen proof exhibits the application of most of these signs:

Explanations of the accompanying symbols and other marks are as follows:

1, A wrong letter. After every mark of correction a line should be drawn, to prevent its being confounded with any other in the same line. 2, A word or letters to be transposed. Where letters are to be transposed they may be stricken out and rewritten in their proper sequence in the margin, like a correction, or they may be underscored, with the marginal "tr." as in the illustration. 3, A space wanted. This mark is used when the spacing is insufficient. 4, A space or quadrat sticking up. 5, Alteration of type. One line drawn under the word for italics, two for SMALL CAPITALS, three CAPITALS. 6, Correction or insertion of marks of punctuation. 7, A word struck out, but afterward approved of (Lat. stet, "let it stand"). 8, A turned letter. 9, An omission. 10, A letter of a wrong font. 11, A word or letter to be deleted (Lat. deletus, p. p. of delere, to destroy). 12, Alteration of type. 13, Begin new paragraph. 14, Insertion of a clause. 15, A space to be removed or diminished. 16, A wrong word. 17, When letters do not line evenly at the base. 18, Mark for a hyphen. 19, Do not make a new paragraph. 20, The manner in which the apostrophe, inverted commas, the star and other references, and superior letters and figures are marked.

The immediate object of a "reader" or corrector of the proof is to observe and mark every error and oversight of the compositor, with a view to make the printed sheet a perfect copy of the author's manuscript. This is on the supposition that the manuscript itself is quite correct, which is seldom the case; and therefore the duty of a good reader extends to seeing that there are no inconsistencies in orthography, punctuation and abbreviations, and in many cases to the verification of quotations, dates and proper names.

'To rule the nations with imperial swoy, to impose terms of peace, to spare the humbled, and to rcush the proud, resigning itto others to describe the courses of the heavens, and explain the rising stars; this, to use the words of the poet of the Æneid in the apostrophe of Anchises to Fabius in the Shades, was regarded as the proper province of a Roman. The genius of the people was ~~even~~ more adverse to the cultivation of the physical sciences than that the European Greeks and ⌈seen⌋ we have ⌊that the latter left experimental philosophy chiefly in the hands of the Asian and African colonists. The elegant literature and metaphysical speculations of Athens, her histories, dramas, epics, and orations, had a numerous host of admirers in Italy, but a *feeling* of indifference was displayed to the practical science of Alexandria. ['This repugnance of the Roman mind at home to mathematics and physics, extending from the Atlantic to the Indian Ocean, from Northern Britain to the cataracts of the Nile, annihilated in a measure ~~all~~ pure sciences in the conquered districts where they had ~~had~~ been pursued, and prohibited attention to them in the mother country

Long, indeed, after the age of Ptolemy, the school in connection with which he flourished, remained in existence; &c

When supposed errors are discovered by the reader they should be referred to the author for verification. In case extensive alterations, omissions or additions are likely to be made

by writer or editor, it is more convenient to take the proofs on long slips, before division into pages. The making of new paragraphs or the suppression of those in type should be avoided since such changes cause trouble and expense.

The thankless and monotonous business of a corrector or reader is more difficult than the uninitiated would believe. It requires extensive and varied knowledge, accurate acquaintance with the art of typography, and above all, a peculiar sharpness of eye, which, without losing the sense and connection of the whole, takes in at the same time each separate word and letter.

PROPOR'TION, in mathematics, an equality of ratios, written in a variety of forms, as $\frac{2}{4} = \frac{8}{16}$, 2:4=8:16 or 2:4::8:16, but usually read 2 is to 4 as 8 is to 16. The first and last terms of a proportion are called its *extremes;* the second and third terms are called its *means.* The general law of proportions is: *The product of the extremes equals the product of the means.* In the proportion 2:4::8:16, 16x2=4x8. An extreme of a proportion may be found by dividing the product of the means by the other extreme, as in the proportion X:4::8:16, $X = \frac{4 \times 8}{16}$, or 2.

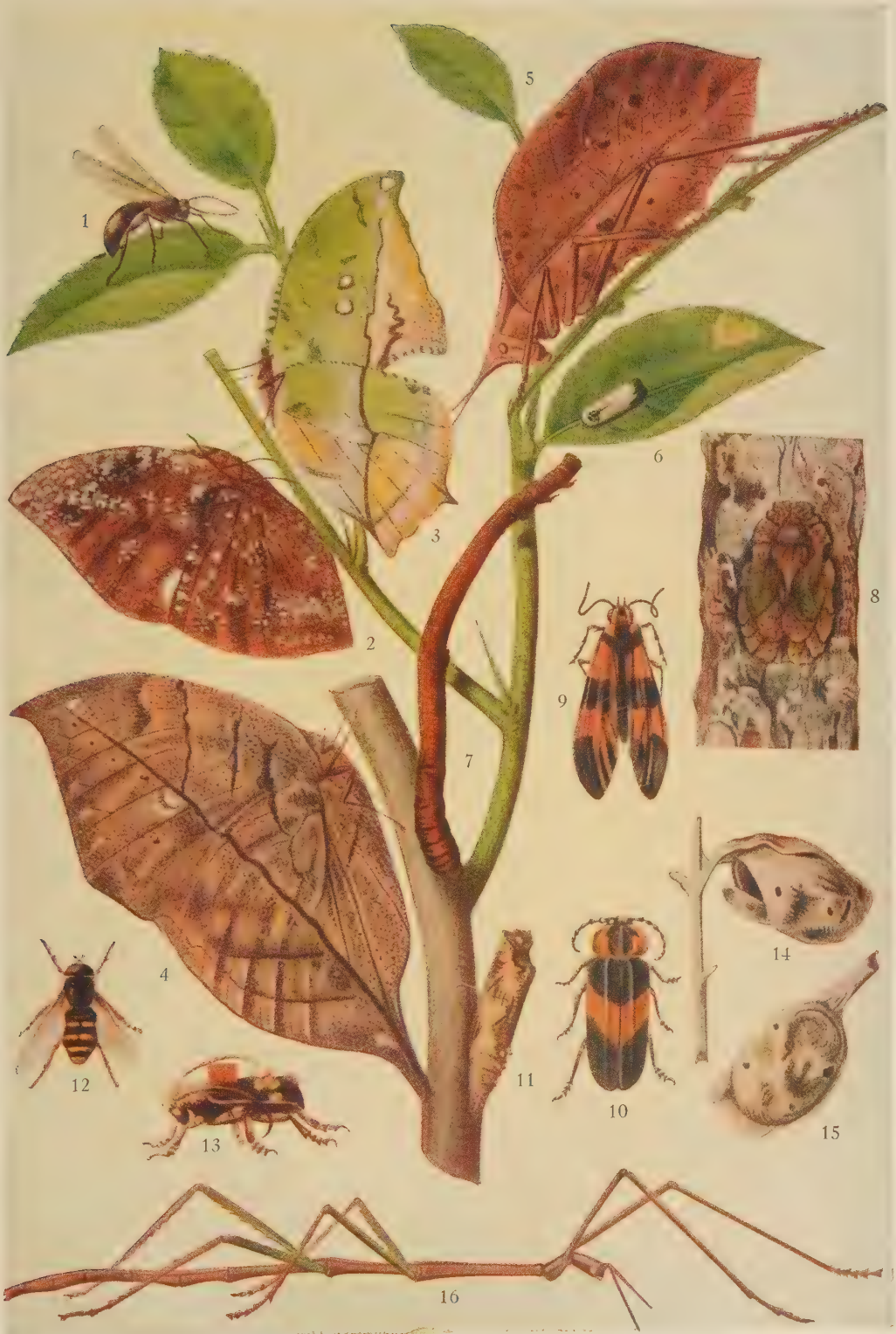
In arithmetic proportion is sometimes called the *rule of three,* because when any three terms are given the fourth can be found. By the application of algebraic processes to a simple proportion, combinations of the various terms are produced so that new relations between them are shown. For instance, using the proportion $\frac{a}{b} = \frac{c}{d}$, by applying algebraic processes, such proportions as the following are produced:

$$\frac{b}{a} = \frac{d}{c}; \quad \frac{a+b}{a} = \frac{c+d}{c}; \quad \frac{a+b}{a-b} = \frac{c+d}{c-d}, \text{ etc.}$$

PROSER'PINA, or **PERSEPHONE**, in classical mythology, the daughter of Jupiter and Ceres. One day while gathering flowers in a plain in Sicily, Pluto, the god of the lower regions, saw her as he drove by in his chariot drawn by black horses. He sprang out, seized the maiden and drove away with her, telling her that he intended to make her his queen. In vain she pleaded to be released; down to his underground home he carried her. Ceres sought for her daughter, and when she discovered what fate had befallen her she implored Jupiter to restore her to earth. He promised on condition that Proserpina had eaten nothing in Hades. When the messenger of Ceres went for Proserpina it was found that she had eaten six pomegranate seeds, and for each of these she was obliged to spend one month each year in Hades, while the other six months were passed on earth. This very ancient myth is a poetic allegory of the change of the seasons.

PROTEC'TION, in economics, a government policy of assisting home industry, either by offering a bounty on the production of a certain commodity, or by placing such a duty upon the foreign article as will make it cost the consumer as much or more than the domestic article of an equal quality. To illustrate: let it be supposed that kid gloves can be made in France so that they can be sold in the United States at $1.50 a pair, but it costs $1.60 a pair to manufacture and sell them in the latter country, at the higher standard of wages prevailing. Without government aid an American manufacturer of kid gloves would have to go out of business, but by placing such a duty on the importation of kid gloves as will make them cost the American purchaser $1.60 a pair, the government enables the American manufacturer to compete with the French manufacturer. Duties may be simply *protective,* that is, of such an amount that the foreign producer can pay the duty and still compete in the market on nearly equal terms; or *prohibitory,* that is, to exclude foreign competition altogether. See FREE TRADE; TARIFF.

PROTEC'TIVE COLORA'TION AND MIM'ICRY. Certain plants and animals exhibit a remarkable resemblance to certain other plants and animals, or to the natural objects in the midst of which they live. These resemblances form one of the best means of protection in the life of the plant or animal. Fish, for instance, are dark above and light beneath so they cannot readily be seen by their enemies from above or below. Frogs, snakes or other animals that live in the grass are green. Those animals that live on the desert are colored like the sand and rock. Some species of hare and the weasel have brown coats during the summer and autumn, and white coats during the winter, while the polar bear and snowy owl, which dwell among ice and snow, are white throughout the year. These are a few illustrations of *protective coloration,* so called, because the resemblance of the animal or bird to its sur-



PROTECTIVE MIMICRY—INSECTS

1, Harmless Brazilian insect resembling a wasp.
2, 3 and 4, Butterflies resembling leaves.
5, South American leaf insect.
6, Moth resembling spot on leaf.
7, Measuring worm that when frightened resembles a dead twig.
8, Brazilian bug resembling bark.
9 and 10, A fly and an offensive beetle.
11, Cocoon resembling broken twig.
12, A harmless fly.
13, Beetle resembling caterpillar distasteful to birds.
14, Bee's Nest.
15, Cocoon.
16, Walking Stick.

roundings prevents it from being easily seen by its enemies.

Mimicry. Mimicry is the term applied by some authorities to the protective coloration in insects, though other authorities believe that *protective coloration* should be applied to all cases of adaptation of color to surroundings. The following illustrations show some of these peculiar adaptations of coloration in insect and vegetable life:

It is well seen in the leaf insects and in the walking-stick insects. Certain tropical butterflies reproduce the appearance of leaves so closely that even the parasitic fungi which grow upon the leaves are imitated. Some caterpillars resemble the twigs of trees and when alarmed stand rigidly out from the branch to increase the likeness. A few flies, whose larvae are parasitic on bees, by closely resembling their host are able to enter the hives and deposit their eggs. A South American moth has a most accurate resemblance to a humming bird; while the cacti of America and the poisonous euphorbias of Africa might easily be mistaken for each other, though widely different in structural character.

PROTEC'TORATE, in international law, a term used to denote the relation of a stronger country to a weaker one, wherein the stronger agrees to protect and defend the latter from aggression of other powers, and to give it counsel in the solution of difficult problems. The relations of the protectorate are usually fixed by treaty, and the country under protection is usually allowed to administer its internal affairs without interference, but it must submit its international affairs to the protecting government for approval. Egypt, Somaliland and Bechuanaland, in Africa, are protectorates of Great Britain.

PROTEIDS, *pro'te idz,* a name given to substances similar in composition to protein, that is, consisting of carbon, hydrogen, oxygen and nitrogen, sometimes united with sulphur and phosphorus. The gluten of flour, albumin, the fibrin of the blood, the chief constituent of muscle and flesh, and casein are examples of proteids. Proteids are the essential foodstuffs.

PROTEINS, *pro'teinz,* foods composed of carbon, hydrogen, nitrogen and oxygen. The same name is given to the nitrogenous material present in the foods, which serve the purpose both of repairing and building up the body and of furnishing heat or energy. See FOOD.

PROTEROZOIC *proh ter o zo'ik* **ERA,** one of the grand divisions of geologic time, intermediate between the Archeozoic Era preceding it, and the Paleozoic Era, following. Great masses of both sedimentary and igneous rock were laid down in this era. In North America the rock systems formed are named, according to locality, the Huronian, that north of Lake Huron; the Keweenawan, that on the southern shore of Lake Superior; the Animikean, that occupying parts of Wisconsin and Minnesota. The last contains the largest deposits of iron ore in the world.

It is believed that life was abundant and varied during the Proterozoic Era, though fossil remains of it are rare. See GEOLOGY.

PROTESILA'US, in Greek mythology, king of Phylace, Thessaly, and son of Jason. He married Laodamia, and soon afterwards set off for the Trojan War. An oracle had foretold that the first Greek to land on Trojan soil would be the first to be slain. When the other chiefs held back, Protesilaus leaped ashore and was instantly killed. Laodamia, overwhelmed with grief, persuaded the gods to grant the return of Protesilaus to earth for three hours. At the end of that time, rather than be parted from him again, she killed herself.

PROT'ESTANT EPIS'COPAL CHURCH. See EPISCOPAL CHURCH; ENGLAND, CHURCH OF.

PROTESTANTS, *prot'es tants,* those who adhere to any Christian church other than the Roman Catholic or the Greek. The followers of Luther constituted the first large body of non-Catholic Christians, but these were not designated Protestants until 1529. In that year prominent representatives of the Roman Catholic Church convened at Speyer and issued a decree enjoining those states that had adopted the new faith to return to Catholicism. Many princes and imperial cities protested against the decree, and from this circumstance became known as *Protestants.* In time the name came to be used to designate anyone outside the Catholic Church. The number of Protestants to-day is approximately 200,000 000.

PROTOPLASM, *pro'ti plaz'm,* a substance, transparent and jellylike in appearance, the real living part of plants and animals. It is the substance of which cells are composed, and it has certain properties which prove that

it possesses life. It has the power of spontaneous motion; it responds to stimuli of various kinds; it has the power of assimilation; it can take up new material and build it into its own substance; it is capable of reproducing its kind.

PROTOZOA, *pro toh zo'ah*, the lowest of the seven groups into which the animal kingdom is divided. All protozoans are simple, one-celled animals, mere particles of protoplasm, usually of microscopic size. The lowest forms (amoeba) have no specialized organs, but, notwithstanding, they are able to perform all the functions necessary to animal life; they eat, move about, excrete waste and reproduce their kind. In some of the higher forms (infusoria) there are hairlike processes which aid in locomotion, and in some there is a rudimentary mouth. Most of the ocean protozoans are enclosed in shells, some of which are marvelously delicate and exceedingly beautiful in color (see FORAMINIFERA). Some of the protozoans reproduce by *fission*, that is, the body of the adult divides and becomes two distinct individuals; others by *budding*, or the production of a minute particle of protoplasm, which in time separates itself from the parent mass and develops an independent existence; or by *spores* or *germs*, which are cast off by the parent body and live for a time an existence altogether unlike that of the true protozoan. In this spore form they are able to withstand drought and cold and may be blown about from place to place. To the spore-producing group belong certain parasitic forms that in the human blood produce malaria and other diseases.

PROUDHON, *proo dohN'*, PIERRE JOSEPH (1809-1865), a French socialist and political writer. In 1840 he published a famous work, *What is Property?*, summing up in it his celebrated dictum, "Property is theft." For this treatise and for two others that followed, he was prosecuted at Besançon, but was ultimately acquitted. From 1844 to 1847 he managed a system of water transport on the Rhône and Saône rivers. He settled in Paris in 1847, edited various socialistic newspapers, became a leader in the Revolution of 1848 and was elected a representative for the Seine in the Constituent Assembly. His attempt to found a People's Bank was unsuccessful. For his outspokenness in the press he was imprisoned for three years; on regaining his liberty he went to Belgium, but spent his last years in France. The titles of his books include *War and Peace, Confessions of a Revolutionary, Solution of the Social Problem* and *Philosophy of Progress.*

PROVENÇAL, *pro vahn sal'*, **LANGUAGE AND LITERATURE.** The Provençal language may be designated as the chief of the literary dialects which flourished in the Middle Ages in France. The name comes from Provence, the province in which it was spoken. Provençal was the earliest of the Romance languages (those based on Latin) to develop, appearing as a new and distinct language early in the tenth century. It produced an extensive literature and continued to be used as a medium of literary expression until the early part of the thirteenth century. In contradistinction to the early language of Northern France (*langue d'oïl*) it has often been called *langue d'oc, oc* and *oïl* being the respective words for "yes" in the two sections.

Provençal prose was weak and empty, but its poetry was in its best day the most famous in Europe (see TROUBADOUR), its lyric verse one of the chief artistic expressions of the Middle Ages. Flourishing as it did in the age of chivalry, it had for its chief themes love and war. Arnaut Daniel, one of its most celebrated singers, is referred to by Dante as the greatest of all poets of love.

In recent times attempt has been made to restore Provençal to its old place as a literary language, and the movement has the support of some of the foremost literary men of France. A society called the Félibrige has been organized for the preservation of the tongue, the members of which are known as Félibres.

PROV'ERBS, one of the canonical books of the Old Testament, usually ascribed to Solomon, containing a collection of short poems, epigrams and proverbs known as the "Wisdom Literature." According to modern Biblical scholars, the book of *Proverbs* is composed of several sections, written by various authors and at different times, ultimately collected into a single book at some period subsequent to the return from the Captivity.

PROVIDENCE, R. I., capital of the state and one of the oldest cities in the United States. It is the county seat of Providence County, the metropolis of Rhode Island and the second largest city in New England, ranking next to Boston. Among American municipalities Providence holds twenty-sixth place,

according to Federal estimates for 1918. Providence has a favorable situation at the head of a tidal arm of Narragansett Bay, known as Providence River. It is thirty-five miles north of the open sea, forty-four miles southwest of Boston and 185 miles northeast of New York. Besides enjoying steamer connection with the chief Atlantic ports of the United States, Providence has adequate railroad facilities, being served by the New York, New Haven & Hartford Railroad system and numerous electric lines.

General Description. The site, covering about eighteen square miles, is slightly hilly, the highest elevation attaining an altitude of 200 feet. This ridge, which is the dividing line between the Seekonk and Providence river valleys, is the site of the campus of Brown University. Because of the peculiarity of its site, the outline of the city is very irregular. The sides and summits of the hills are covered with beautiful dwellings, some of them dating from colonial times, while the business part of the city is on the lower land along the river and bay. In the older part of the city the streets, like those of Boston, are narrow and crooked. There are over forty public parks, whose combined area is 650 acres. The most important of these is Roger Williams Park, on the south side. This contains a statue of Roger Williams and has a fine system of boulevards, besides gardens and lakes. In front of the city hall is a soldiers' and sailors' monument, and near it is a statue of Gen. Ambrose E. Burnside.

Buildings and Institutions. The most important public buildings are the new state capitol, constructed of marble and granite; the Federal building, the county courthouse, the city hall, the public library, the Athenaeum, the Union Railway Station and a number of office buildings, including the Bannigan building, the Industrial Trust building, the Equitable building, Barton Block, Merchants' Bank and National Exchange Bank. Churches of interest because of their historical associations are the First Baptist Church, connected with Brown University; Saint John's Church, one of the oldest Episcopal churches in New England, and the Beneficent Congregational Church.

The educational institutions include Brown University (which see), the Friends' School, the state normal and the Rhode Island School of Design. The leading charitable and philanthropic institutions are the Butler Hospital for the Insane, the Rhode Island Hospital, Rhode Island Homeopathic Hospital, Saint Joseph's Hospital, the Dexter Asylum for the Poor and the state institution for the deaf. The Rhode Island Historical Society occupies a fine building of brick and granite and has a valuable library. In addition to this are the Providence Public Library, the Athenaeum Library, the libraries of Brown University and the John Hay and John Carter Brown libraries.

Commerce and Manufacture. Providence is one of the most important industrial centers of New England. Chief among its manufacturing enterprises are those devoted to the manufacture of jewelry and allied products. Closely associated with the jewelry industries is the manufacture of silverware. In both of these industries Providence ranks among the leading cities of the United States. It is also the leading city in the manufacture of files and screws, and other manufactures include worsteds, woolen goods, cotton goods, rubber goods, engines, locomotives, machinery and stoves. Dyeing and bleaching and brewing are also of considerable importance. The city has an extensive coastwise and inland trade, but its foreign commerce was long retarded because the harbor would not admit the largest ocean vessels and because of inferior docking facilities. Efforts are being made to develop foreign trade, and a state pier of sufficient size to dock ocean liners was completed in 1914.

History. Providence was settled in 1636 by Roger Williams, and is noted as the first settlement in New England in which religious freedom was guaranteed the inhabitants. Williams named the place Providence in recognition of his providential escape from the perils of the wilderness on his journey from Salem, Mass. It was also here that the first Baptist church in America was founded. The settlement grew slowly, and at the end of the first century of its existence, it numbered scarcely 4,000 inhabitants. In 1676, during King Philip's War, the Indians attacked the town, burning over one-third of its houses. In 1815 part of the town was flooded during a great storm. After this, however, the place prospered, and was incorporated as a city in 1832. Population, 1910, 224,326; in 1918, 263,613 (Federal estimate).

PROVINCE, *prov'ins*, a geographical division of the Dominion of Canada similar in character and powers to a state of the United

Outline on the Province

I. Location
- (a) Latitude
- (b) Longitude
- (c) Boundaries

II. Extent
- (a) Length
- (b) Breadth
- (c) Area
- (d) Compare with other provinces

III. Outline
- (a) General form
- (b) Boundaries
- (c) If there is coast line
  - (1) Length
  - (2) Indentations
  - (3) Projections

IV. Surface
- (a) General facts
  - (1) Mountains or great hills
  - (2) Plains
  - (3) Valleys
  - (4) Watersheds
- (b) Effects on climate

V. Drainage
- (a) River systems
- (b) Lakes
- (c) Springs

VI. Climate
- (a) Natural conditions expected
- (b) How changes are wrought by physical features
- (c) Effect on health
- (d) Compared with other provinces or countries in same latitude
- (e) Average annual rainfall

VII. Products
- (a) Agricultural
  - (1) Grains
  - (2) Stock raising
  - (3) Dairying
  - (4) Fruits, etc.
  - (5) Rank among provinces
- (b) Mineral
  - (1) Precious metals
  - (2) Iron, coal, copper, zinc
  - (3) Oil and gas
  - (4) Rank among provinces

VIII. Commerce and Industry
- (a) Railways and canals
- (b) Navigable rivers
- (c) Commercial centers
  - (1) Ten largest cities, in order
  - (2) Population of each
  - (3) Distances from other cities
- (d) Principal manufactures

IX. Population
- (a) Rate of increase
- (b) Per cent of native Canadians
- (c) Countries furnishing foreign-born proportion
- (d) Where densest, and why

X. Government
- (a) Provincial departments
  - (1) Executive
  - (2) Legislative
  - (3) Judicial
  - (4) How officers are chosen
  - (5) Length of terms
  - (6) Duties
- (b) Number of counties
- (c) Number of members in Parliament
- (d) State institutions
  - (1) Penal
  - (2) Charitable
  - (3) Education of defectives

XI. Education
- (a) Public school system
  - (1) Common schools
  - (2) High schools
  - (3) Normal schools
  - (4) Industrial education
  - (5) Provincial University
- (b) Colleges
- (c) Private and separate schools

XII. History
- (a) Exploration
- (b) First settlements
- (c) Date made a territory
- (d) When admitted to Dominion
- (e) Events that are historical
- (f) Famous men and women

XIII. Statistical
- (a) Rank among provinces in mineral products
- (b) Rank in farm products
- (c) Rank in area
- (d) Rank in population

States. The provincial government is modeled very closely after the general character of the Dominion government. The constitution of the province is practically the constitution of the Dominion, for the latter expressly dictates what matters may be dealt with by the provincial governments. Within these limits it is free to act as it pleases. The provincial government, like that of the Dominion, has three great departments, the executive, the legislative and the judicial. See OUTLINE, herewith.

Related Articles. The various departments relating to a province are described under the following titles in these volumes:

Executive Council — Lieutenant-Governor
Legislative Assembly — Provincial Courts

PROVINCIAL COURTS, IN CANADA. As the British North America Act gives to the provinces exclusive control over all matters affecting property and civil rights, the provincial courts have to deal with subjects that affect intimately all classes of persons. On the other hand, the Dominion Parliament alone makes laws relating to crime and criminals, but the trial of offenders must take place in the courts of the province, which have the right to administer justice. In other words, the provincial courts have absolute powers in all civil and criminal actions at law, but the Dominion Government determines the course of procedure in criminal cases. This division was due to the fact that in the province of Quebec the code of French civil law prevailed, whereas in the other provinces the civil law was based on English procedure. The criminal law of England has prevailed in all the provinces since 1763, but the civil code has always been different. This difference made it necessary to allow the provinces complete control of civil law.

The provincial courts are of various kinds and differ in each province. It is impossible to give a complete list of all the courts, but a short summary of the classes into which they may be divided will be of value, as showing the principles on which all the systems are based:

1. Inferior courts of civil jurisdiction, for the recovery of debts and the settlement of civil actions where small sums of money are at issue.

2. Inferior courts of criminal jurisdiction, for petty offences and for preliminary examination in cases of serious crime.

3. Superior courts, for the trial of civil and criminal cases before a judge and jury in each judicial district.

4. Special courts for the dissolution of marriage, proving of wills, trial of disputed elections, etc.

5. Supreme Court, a court of appeal, for each province.

PRO'VO CITY, UTAH, the county seat of Utah County, forty-five miles south of Salt Lake City, on the Provo River and on the Denver & Rio Grande and the San Pedro, Los Angeles & Salt Lake railroads, and an electric line to Salt Lake City. The city is in a farming, stock-raising and fruit-growing region, and it has canneries, flour and lumber mills and manufactories of woolen goods, roofing and other articles. Provo Cañon, Utah Lake and Bridal Veil Falls are of considerable scenic interest. The Brigham Young Academy is located here, and the city also has a state asylum for the insane, a Mormon tabernacle and the Proctor Academy. The place was settled in 1849, and incorporated in 1851. The commission form of government was adopted in 1910. Population, 1910, 8,925; in 1917, 10,923 (Federal estimate).

PRUNE, a dried or preserved plum. One of the best prune plums is grown in the valley of the Loire, in France, long the chief prune-producing country of the world. Other European centers of the prune industry are Germany, Austria, Spain, Portugal and certain Balkan districts. South America is also an important producer. Prune culture started in California in the middle of the last century, and to-day that state, Washington and Oregon produce more prunes than all other prune-producing districts combined. Food purveyors declare that the consumption of prunes is on the increase, both in the United States and in Canada.

PRU'NING, the cutting portions of a plant, as stem, branches, shoots or roots, for the purpose of checking growth in one direction and assisting it in another. While the immediate effect is to reduce the growth of the plant, it ultimately tends to produce a larger and stronger plant. Plants are pruned for various purposes. The gardener prunes to change the form of his plant, or to increase the size and brilliancy of the flowers; the nurseryman prunes to aid the plant in perfecting its fruit. Pruning should be done when the plant is in full vigor, as the wounds then heal quickly. Branches should be cut close to the part from which they are taken, and if they are large, the wound should be covered with paint or wax, to protect it from the weather.

A typical castle

PRUSSIA, *prush'a*, from 1871 until 1918 a kingdom of the German Empire, the largest, wealthiest and most important of the German states. Its king, an hereditary monarch of the Hohenzollern family, was emperor of Germany, and Berlin, its capital city, was also the seat of government for the whole empire. In Prussia the German military spirit had its most vigorous expression, and throughout the World War the Prussian kingdom was the dominating section of the empire. Its position in the German republic set up at the close of the war was not so certain. A democratic régime was established in Prussia, as in the other German states, and in the deliberations of the national assembly, which met at Weimar early in 1919, there was evident a tendency to distribute the powers of the states more equitably. Under the empire Prussia had been dominant in the German Parliament.

With an area of 134,616 square miles, Prussia covered three-fourths of the territory of the empire, almost encircling the grand duchies of Mecklenburg and Oldenburg, the duchies of Anhalt and Brunswick, the Lippe and Waldeck principalities, and the free cities of Hamburg, Bremen and Lubeck. It comprised fourteen provinces. Its population in 1910 was 40,165,219, or about two-thirds that of all Germany.

By the terms of the Treaty of Versailles (1919), imposed on Germany at the close of the World War, Prussia was deprived of over 30,000 square miles of its original territory. To Poland were ceded outright Posen and the province of West Prussia on the left bank of the Vistula River. Because of the protests of the Germans the allies consented to a plebiscite in Silesia to determine what portion of that province should be ceded to Poland. The Prussian city of Danzig, on the Baltic Sea, was made a free port under guarantee of the league of nations. East Prussia was isolated from the rest of Germany, and the southeastern third of that province was to have its nationality determined by vote of the people. Other boundaries between East Prussia and Poland were also to be determined in like manner. In addition, the Danish part of Schleswig, belonging to the Prussian province of Schleswig-Holstein, was to revert to Denmark after a vote of the people was taken.

History. The historical development of the Prussian kingdom is closely associated with two important elements. The first of these is found in the growth in power of the electorate of Brandenburg, which formed the nucleus of the future kingdom of Prussia. The second is associated with the rule of the Hohenzollern family, under whose skilful diplomatic and military guidance the small electorate of Brandenburg grew into an important kingdom.

The Prussians were a Slavonic people, inhabiting the coast territory between the Vistula and the Niemen. Their neighbors, the Poles, endeavored to convert them to Christianity, and to this end conquered the whole country, with the aid of the Teutonic Knights (1283). As the price of their assistance, the knights claimed the conquered territory, and established themselves in castles and walled cities. Their rule was finally overturned by the combined forces of the Prussians and the Poles, and in 1466 West Prussia was ceded to Poland and East Prussia was held by the Teutonic Knights as a fief of Poland. A member of the Hohenzollern family came to power in East Prussia in 1511, and he succeeded in having the state declared a duchy, with himself as hereditary ruler. When the line of his descendants failed, in 1618, the duchy of Prussia was added to Brandenburg, which was ruled by a member of another branch of the Hohenzollern family, John Sigismund.

John Sigismund was succeeded in 1619 by his son, George William, who proved unequal to the crisis of affairs in Germany, brought about by the Thirty Years' War. The electorate suffered severely in this struggle, and when Frederick William I, called the Great Elector, came to the throne in 1640, he found his territory occupied by a Swedish force. Frederick William may be regarded as the virtual founder of the Prussian monarchy. He made Brandenburg a military state and won for it recognition from the powers of Europe. The Great Elector, on his death in 1688, was succeeded by his son Frederick, who in 1701 was crowned first king of Prussia. He was succeeded by his son, Frederick William I, whose reign, which lasted until

1740, was on the whole peaceful. A war with Sweden, however, won for the new kingdom a great part of Swedish Pomerania.

Frederick II, called the Great, came to the throne on the death of his father in 1740. In less than a year after his accession he proclaimed war against Maria Theresa, in order to enforce his claim to Silesia. With varying fortunes the struggle continued until the Peace of Hubertsburg, 1763, which closed the Seven Years' War. The outcome of this war transformed Prussia into one of the first-rate European powers, and the first partition of Poland, which took place in 1772, greatly enlarged the country by the addition of West Prussia.

The successor of Frederick II, his nephew, Frederick William II (1786–1797), interfered in the affairs of France on behalf of Louis XVI, and in consequence he was forced to give up the territory which Prussia had possessed west of the Rhine. A second and a third partition of Poland brought to Prussia considerable accession of territory. Frederick William III, who succeeded to the throne in 1797, attempted at first to remain neutral in the general European struggle against Napoleon. This attitude, however, ultimately led to distrust among the German states, and the formation by the other states of the Confederation of the Rhine left Prussia at the mercy of Napoleon. When in 1806 Frederick William found himself driven into the struggle against France, the result was complete defeat at Jena and Auerstädt. By the peace of Tilsit (1807), the country was deprived of all lands between the Rhine and the Elbe.

The years which followed were marked in Prussia by sweeping internal reforms, which the crisis necessitated and which were efficiently carried out under Stein, Hardenberg and Scharnhorst. Owing to these reforms, which amounted almost to a revolution, Prussia was able, after Napoleon's disastrous Russian campaign of 1812, to take an important part in the final struggle for his overthrow. At the Congress of Vienna in 1815 Prussia was deprived of some of her possessions, but was recompensed with others which were of more value to her. She also formed one of the states of the German Confederation.

After the restoration of peace, Frederick William III was guided by the councils of Metternich and the Holy Alliance, and he entered upon a reactionary policy, which continued until his death in 1840. Frederick William IV, who succeeded him, tried in 1847 to anticipate the revolutionary movement, which he saw to be imminent, by summoning a general legislative assembly. No real power, however, was conferred on this parliament, and in the following year the king was forced to dismiss his ministers and grant a constitution. In 1849 the imperial crown was offered to Frederick William, but he refused it, and thus he lost the opportunity of placing himself at the head of a united Germany. For the further history of Prussia, the union of the German states under its leadership, and the effects of the World War, see GERMANY, subhead *History*.

Related Articles: Other phases of the history of Prussia will be found under the following headings:

Bismarck-Schönhausen	Frederick William III
Brandenburg	Frederick William IV
Danzig	Hohenzollern
Franco-German War	Schleswig-Holstein
Frederick I	Seven Weeks' War
Frederick II	Seven Years' War
Frederick III	Succession Wars
Frederick William	William II

PRUS'SIC ACID, or **HYDROCYANIC ACID,** an acid discovered by Scheele in 1782, but first prepared in the pure state by Gay-Lussac in 1811. It is a colorless liquid which solidifies at 5° F. to feathery crystals, and which boils at 80°. It dissolves in all proportions in water, forming a liquid which reddens litmus paper but slightly. In nature it occurs in the kernels of bitter almonds, peaches, apricots, plums, cherries and quinces; in the blossoms of peaches and aloes; in the leaves of beech, cherry and laurel, and in various parts of other plants. Pure prussic acid is artificially obtained by passing a stream of dry sulphureted hydrogen over dry cyanide of mercury. This acid, which is one of the strongest poisons known, is used medicinally to remove various forms of irritation; but in all cases it must be used with extreme caution.

PSALMS, *sahmz,* BOOK OF, one of the books of the Old Testament, containing the religious poetry of the Hebrews. The collection consists of 150 compositions, divided in the Hebrew Bible, like the Pentateuch, into five books. The Psalms are perfect lyric outpourings of the finest human emotions, and each, with a few exceptions, has a particular superscription, such as *Maschil,* instruction, or *Michtam,* memorial.

The chronology of the Psalms is much disputed. The earliest are credited to Moses, many are attributed to David, a few are sup-

posed to have been written on the return from the captivity, and some in the time of the Maccabees. The twenty-third Psalm, beginning "The Lord is my shepherd, I shall not want," the most familiar of all the Psalms, was written by David, and is reminiscent of his early life among the sheepfolds.

PSEUDONYM, *sū'doh nim,* a word derived from the Greek, and meaning a *false name,* is the term usually applied to the pen name of authors, as the name *Lewis Carroll,* used by the author of *Alice in Wonderland,* his real name being Charles Dodgson; *Uncle Remus,* the name which Joel Chandler Harris attached to many of his tales, is also another familiar pseudonym. *Nom de plume,* the French for *pen name,* is frequently used by the English, but it is not employed by the French.

PSYCHE, *sī'ke,* in classical mythology, an exquisitely beautiful maiden. Her beauty aroused the jealousy of Venus, and that goddess instructed her son Cupid to kill Psyche, or to cause her to fall in love with some ugly wretch. Cupid went to do his mother's bidding, but himself fell in love with Psyche, and coming to her in darkness told her of his love and claimed her as his wife. He demanded of her a promise that she would never seek to see his face, and after that came nightly to be with her. Psyche, aroused to suspicion by her jealous sisters, one night lighted a lamp and held it over Cupid while he slept. The god's beauty gave her a start, and she spilled a drop of hot oil upon his shoulder. Cupid arose, reproaching her for breaking her promise and left her; and Psyche, forlorn, wandered far and wide in search of him.

Venus imposed many cruel tasks upon her, and Psyche tried to perform them all, hoping thereby to gain the goddess' help in her quest. At last, weary and in despair, she sank down by a roadside and fell asleep. Cupid, passing by, saw her, and, overwhelmed by his love for her, took her to Olympus and pleaded with the gods to make her immortal. Psyche's appealing beauty touched even Venus, and the lovers were reunited. Psyche is believed to symbolize the heart, Cupid the soul; and the trials the unhappy mortal was forced to undergo are but the struggles the human heart must experience before it attains perfection.

PSYCHOLOGY, *si kol'o jy,* the science which treats of the development and activities of the mind. Psychology also recognizes the intimate relation between mind and body, and the influence of physiological conditions over mental activity. It draws a sharp distinction between physiological and mental activities; neither can merge into the other. However closely related mind and body may be, an impossible barrier is fixed between them.

Until within recent times, all psychologists spoke of the different powers of the mind as *faculties,* and treated them as separate powers, as the *faculty of memory,* the *faculty of reason,* and the *faculty of will.* Modern psychology has discarded this idea of faculties and considers the mind as a unit capable of so acting as to produce the results formerly attributed to the faculties. For instance, when we wish to recall a past experience our mind acts as *memory;* when we wish to relate a new idea to our experiences, our mind acts as *reason,* etc. Therefore, when in this article various activities of the mind may be mentioned as memory, imagination or will, the reader should remember that this is done for the purpose of setting clearly before his mind the activity under discussion. In all phases of our discussion the mind is considered as a unit.

Phases of Mental Activity. Activities of the mind are characterized by three phases, knowing, feeling and willing. Psychologists are divided in opinion as to which phase, knowing or feeling, is first in consciousness; hence, we find some authorities stating that feeling is dependent upon knowing, and others asserting that knowing depends upon feeling. Knowing is the result of attention, and attention is an act of will; but in order that the attention may be fixed upon any object, that object, whether of sense or of thought, must have some value for the mind; that is, the mind must entertain a desire to know something about the object, and this desire causes the will to direct the activities of the mind or center the attention upon it. The desire is feeling, but it is of little importance to know whether knowing or feeling takes precedence.

Knowing. Every activity of the mind may be considered as giving us knowledge, since it has reference to some object of sense or of thought, as a house already in existence, a mathematical theory to be developed, or the illness of a friend. The ideas arising from our mental activities become a part of the

content of the mind and modify our mental life to a greater or less extent, according to their nature and importance. Ideas are acquired through two sources, the special senses and the reaction of the mental activities upon each other. The senses give us ideas of the external world, and the working of the mental powers gives us those ideas produced by thought, such as scientific treatises, resolutions affecting our lives and theories of government. However, the mind is awakened to activity by its reaction upon the impressions brought through the senses.

Feeling. Every idea appeals to the individual with more or less force, that is, it has its own particular value. To the extent of its value it arouses the feelings or, as we usually express it, awakens within us an interest. Some ideas are much stronger than others. In the case of the child, the pain caused by the injury from the tack will arouse his feelings to a higher degree of activity than the impressions made by the orange or the story. The feeling is given definiteness through the idea with which it is associated, so that whether or not feelings constitute the first phase of mental activity, through *knowing* they are given definite form and value, and the feeling is always associated with the idea.

Willing. Willing is related to both knowing and feeling. Attention is the first essential to knowing, and we have already stated that attention is an act of the will. Furthermore, willing may be considered as the action or the motor element accompanying the idea. The knowledge of the orange may arouse the child to a desire to obtain it, and this will lead to whatever action is necessary to secure the fruit. This action includes: (a) decision, a mental act; (b) execution, or carrying the decision into effect.

Relation of these Phases. The three phases of activity are not present in every idea in equal proportion, and for this reason they are considered by some authorities to be antagonistic; but the antagonism consists merely in one phase becoming so prominent as to overshadow the others. Intense feeling or intense action suppresses the knowing phase of activity and is seldom accompanied by clear ideas; on the other hand, when the knowing phase is most active, it is accompanied by a moderate degree of feeling, and the willing is confined to concentrating the mental powers upon the object.

Development of Mental Powers. The development of the mental powers keeps pace with the growth of the physical organism. This development is along the following lines:

(1) Operations which were at first difficult and slow become increasingly easy and more rapid from repetition.

(2) New operations of an equal degree of difficulty grow easier; the powers of observation become keener and more comprehensive; the memory retains more readily and recalls past impressions with a greater degree of ease; thought becomes more mature, and the judgment more accurate.

(3) Ability is acquired to execute more complex and difficult operations. The man is capable of making nicer distinctions and broader classifications than the child; he also possesses a power of analysis which enables him to solve intricate problems, discover new laws and formulate theories. Our systems of jurisprudence, government, sociology, theology and many institutions which affect society are the result of the exercise of these powers by the ablest minds.

Order of Development. The mental powers do not all develop equally at the same time. The early period of life is spent in gaining knowledge of the external world, and those powers by which the mind becomes acquainted with its environment are at this time the most active. These are the powers of sensation, perception and memory. During the first ten or twelve years of the child's life the senses are keen, and they should be trained, not only to observe broadly, but also to make nice distinctions. During this period the memory is especially active.

The ideas acquired react upon the mind, and the child is continually comparing and classifying, at first roughly, and then with greater discrimination. As the mental powers mature, the thinking power becomes active, along with the memory, and this brings into play the constructive power of the imagination, by means of which the child builds many curious things from the material at his disposal and constructs wonderful castles in the air.

The feelings and the will develop along with the so-called intellectual powers. At first the feelings are not under control; the child abandons himself to his joys and sorrows without restraint. Gradually the will begins to assert itself, and the emotions become less violent. They are also directed so that they assist the perception, memory and other intellectual powers. The child is intensely interested in his surroundings, and

Outline on Psychology

The Mental Powers

I. The Intellect
  (1) Perception
    (a) Sense perception
    (b) Self-perception
    (c) Its cultivation
  (2) Representation
    (a) Memory
      (1) Laws of memory
      (2) Cultivation of memory
    (b) Imagination
    (c) Phantasy
  (3) Thought
    (a) Concept
    (b) Judgment
    (c) Reason

II. Feeling
  (1) Sensuous
    (a) Special
    (b) Organic
  (2) Ideal
    (a) Altruistic
    (b) Egoistic
  (3) Intensity of feeling
    (a) Depends on—
      (1) Amount of stimulus
      (2) Prolongation of stimulus

III. The Will
  (1) Interest
  (2) Attention
    (a) Voluntary
    (b) Attracted
    (c) Development of
  (3) Choice
  (4) Action
    (a) Reflex
    (b) Instinctive
    (c) Impulsive
    (d) Result of purpose

Questions on Psychology and Pedagogy

Which phase of mental activity, knowing or feeling, is first in consciousness?

What is the most difficult stage of thinking? What can you say of its development? What are the two general methods of reasoning?

What is the first act of the imagination in constructing the image?

Distinguish between memory and imagination.

What power of the mind would be exercised in thinking of the human head joined to the body of a horse?

Fairy tales belong to what phase of imagination?

Why are they adapted to the child mind?

During what period in life are most of our habits formed? Why?

In what way does interest differ from desire?

What is the relation of psychology to physiology?

What are the processes of obtaining an idea?

Explain how an action becomes a habit both from the mental and from the bodily standpoint.

Why is it true that good habits are our best friends, and that bad habits are our worst enemies?

Compare the child's process of obtaining knowledge with that of mature minds.

What powers of mind are cultivated in the moral education? The mental? The physical?

What three steps are necessary in thought? Explain them.

What do we mean by the term logic? Logical mind?

What are some of the actions in life taken care of through habit?

Give processes of acquiring habit.

If it were not for habit how would the higher powers of the mind suffer? Would there be any development? Why not?

Why is it difficult for people to change their views or channels of work in middle life or old age? Of what great benefit is this to the progress of the world?

Through what channels is the mind aroused?

How is perception related to sensation?

Are ideas obtained through sight and touch to be depended upon?

Which of the senses are the most reliable and generally most accurately trained?

How can perception be trained?

What is the difference between conception and perception?

What is the chief thing accomplished by thought?

What stage of thought is judgment? What is its particular work?

Reason is what stage in thought? What is its work?

Why are subjects that appeal to observation and thought power valuable for memory training?

What depends in later life upon formation of correct concepts in early training?

Define interest; imagination; attention; apperception.

Where is the force of habit stronger, in the physical or the intellectual powers? At what times is habit a protection from a physical standpoint? The intellectual standpoint? The moral standpoint?

Child Study

What is included in child study? What is the aim? How can both teacher and parent assist in this?

By what is a child's ability limited?

Why should a teacher have knowledge of the physical condition of the child? Is this often ignored? With what results?

Why should a teacher be familiar with a child's environment at home? How does this affect her treatment of the individual child?

What effect does the mind have upon the body? The body upon the mind?

How has the subject of discipline changed? With what results?

What beneficial results have followed in the wake of kindergartens, normal schools, individual work by teacher, etc., in home, schools, community and to the child?

Methods

What is meant by the term "method"? Upon what should it be based?

What is a "device"? Its general use? Is it harmful? When?

Why is application, or use, the true test of all knowledge?

What in general should be the aim of a teacher in her methods?

What is the great end and aim of education?

Which are the more important, principles or facts?

Senses

In what order are the senses developed?

What sense gives us the widest range of knowledge? What is the next in importance?

At what period of growth are the senses very keen?

Should any of the senses be trained to the neglect of the others? Is this often done in the schoolroom and home? What are the results?

Upon what powers of mind is the acquiring of knowledge based in the primary grades?

Attention

How does fatigue affect the mind?

Distinguish between voluntary and involuntary attention.

In presenting a subject what are the processes in securing the attention of the child?

Why should a lesson be conducted from the known to the unknown?

Upon what does attention depend?

Why is it easier to secure the child's attention in the early hours of the morning?

Why are recitations often dull? What is lacking?

Why is it that many people make a failure of life in a certain sense? Where and how could this have been remedied?

What are some of the methods of training the attention?

What is the importance of attention in the development of the mind?

What are some of the methods of awakening the interest of the pupil?

Distinguish between interest and desire.

Why is it easier to interest the child than the adult?

What should govern the length of a recitation?

What are some of the ways of stunting mental growth?

How does interest in the subject affect the memory?

How can a child be taught to observe carefully and correctly? What is the im-

portance of this? What powers of mind depend upon correct observation? At what time in life is observation the most important source of information?

Memory

Upon what does memory depend? When is it especially active?

What are some of the devices a teacher may use to strengthen memory?

Is it possible to have knowledge without memory?

Is a child supposed to memorize what he does not understand? If so, how far is it practical to do this and with what end in view?

Why is memory of so much importance? Is it really a part of every other power of the mind?

What studies are especially valuable for training the memory?

How is memory affected by repetition?

How does interest in the subject affect the memory? What is the importance of interest in class recitals from this standpoint?

Why is it that two persons viewing the same scene will obtain different mental pictures of it?

How do habits of reading affect the memory for good or ill?

What dangers lie in the use of the mechanical memory?

Habit

To what does the repetition of an act finally lead?

In what way does habit affect the physical, intellectual and moral nature?

What do we mean by a plastic condition of the mind or nervous system? Why are habits formed more easily in early youth? After what age are important habits seldom formed?

In what ways can a teacher assist in the formation of good habits?

How does habit determine character?

Why do we save time and strength by means of habit?

Could a mechanic past middle age easily take up the study of medicine? Explain your answer.

Explain what is meant by this statement: "A well-trained nervous system is the greatest friend that the mind can have."

Reason

At what age is a child supposed to begin to reason? What studies in the lower grades develop the reasoning powers?

What is the importance of judgment in reasoning and upon what does it primarily depend?

To what grade of school work is the inductive method of reasoning best adapted?

What is the deductive method of reasoning and to what department of school work is it best adapted?

Will

What is instinct? What finally results from it?

What is the difference between an impulse and a desire? In which is the will brought into action?

What is meant by deliberation? To what action does it lead? What is the difference between a mature will and that of a child?

Why does choice involve so many difficulties?

Is will the means of preventing action as well as performing it? Give examples of both states of mind.

How may the will be cultivated? What factor is it in the formation of habits?

Upon what is stubbornness based? Is it an action of the will?

Will exercises what control over the feelings? Does its control extend at last to all mental powers? With what effect?

Why is will the highest of the mental powers?

What are the successive steps in an act of will?

Why should each person of mature mind make his own decisions?

How does the ability to choose vary with different persons?

What function of the will is exercised when we refrain from action? What is its importance?

What is the relation of one's physical state to the exercise of the will? Of one's mental state?

for this reason the ideas gained during his early years remain with him through life. The development of feelings, like that of the intellectual powers, is along the lines of finer discrimination and broader application. As one's knowledge is extended, one's sympathies are broadened and one's likes and dislikes are modified.

The will gains in strength and pliability and extends its control over all other mental powers. Its activities are complex, and it seldom reaches its highest culture before adult life and in many cases not until later.

Development of the Brain. The growth of the brain continues until the twentieth year, but its internal development continues into mature life. Within this marvellous organ are thousands upon thousands of nerve cells known as *neurones,* and this internal development consists in the perfection of these neurones and the extension of their functions, especially of the *associative,* or *connecting,* neurones, which form the most elaborate mechanism in the brain. It is the function of these neurones to connect the sensory with the motor nerves. As these neurones approach perfection, the mental powers increase in power and efficiency.

While the mental powers are active through life, we rely upon some at one period and upon others at another. The child relies more upon his powers of observation; the man, more upon reason and judgment. The child reproduces past events by memory; the man often arrives at the same result by a course of reasoning. The more complex activities, such as reason and judgment, depend upon the simpler activities, observation and memory. Therefore, unless these simpler activities are brought to a high degree of perfection at the proper period in life, reason and judgment can never reach their fullest development.

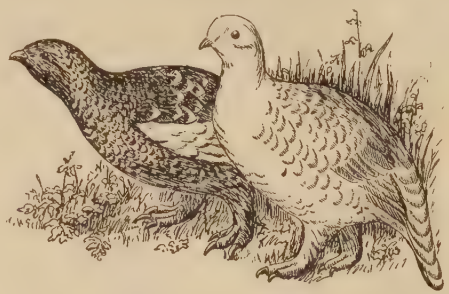
Related Articles. Consult the following titles for additional information:

Apperception	Feeling	Memory
Association of Ideas	Free Will	Mind
Attention	Habit	Pedagogy
Brain	Hallucination	Perception
Child Study	Imagination	Reason
Concept	Instinct	Senses, Special
Dreams	Interest	Thought
	Judgment	Will

PSYCHOLOGISTS

Dewey, John	Helmholtz, Hermann
Galton, Francis	James, William
Hall, G. Stanley	

PTARMIGAN, *tahr'mi gan,* a bird of the grouse family, distinguished from the true grouse by its feathered toes and noiseless flight. In winter the plumage of most species becomes white, and even in summer much of it remains so. The ptarmigans live in cold



PTARMIGANS
Summer and winter plumage.

regions of the northern hemisphere, and find their living among the lichens, mosses and stunted plants that grow on the rocks and in the snow. They nest on the ground and lay from six to eleven eggs, ranging in tint from cream to reddish-buff and marked with brown or black splotches.

PTERIDOPHYTES, *ter'i do fites,* the fern plants, one of the four great divisions of the vegetable kingdom. They are next in rank to the flowering plants, which they resemble in many respects. The group embraces ferns, horsetails, clubmosses and many forms that are now extinct. The ferns are the most numerous, there being about 4,500 species (see FERNS). Of the horsetails there are only about twenty-five species. They have jointed, branching stems, which give the plant a conical contour, and no foliage. The clubmosses, of which there are about 500 forms, have trailing stems thickly covered with tiny foliage leaves.

PTERODACTYL, *ter o dak'til,* extinct flying lizards, remains of which are found in the Jura limestone formations, in some sections of Europe. The pterodactyl had a moderately long neck and a large head. The jaws of the earlier genera were armed with equal and pointed teeth; later animals lost their teeth, but developed very long jaws. The skeleton was light, and most of the bones were hollow and filled with air; but the chief characteristic consisted in the excessive elongation of the outer toe of the fore foot, which served to support a flying membrane, forming a wing somewhat resembling the wing of a bat. A number of species have been discovered, the size ranging from twelve

inches to twenty feet. Some of the animals were powerful flyers, while others could only

SKELETON OF PTERODACTYL

volplane downward from high places like the so-called "flying" squirrels.

PTOLEMY, *tol'e my,* the name of a line of kings, who succeeded, on the division of the empire of Alexander the Great, to the part of his dominions of which Egypt was the head.

Ptolemy I (367–283 B. C.) (called Soter meaning the Savior) was by birth a Macedonian. On the death of Alexander he secured for himself the government of Egypt and made Alexandria a center of Greek culture. He was a great patron of art, learning and literature and founded the celebrated Alexandrian library. The lighthouse on the island of Pharos was built during his rule.

Ptolemy II (308–247 B. C.) succeeded his father and reigned in almost complete peace. His chief care as ruler was directed toward the internal administration of his kingdom.

Ptolemy III (282–222 B. C.) who was surnamed Euergetes, meaning the benefactor, brought Egypt to a very high stage of prosperity. He was not only a conquerer, but also, like his predecessors, a patron of learning.

Ptolemy V (210–181 B. C.) was not five years old at his father's death, and Philip of Macedon and Antiochus III of Syria combined to dispossess him and divide his dominions. To avert the threatened danger the guardians of the young king placed him under the protection of Rome, which thus had for the first time an occasion for interfering in the affairs of Egypt. During the reigns of the succeeding Ptolemies the influence of the Romans in Egypt gradually increased and the independence of the native sovereigns gradually decreased.

Ptolemy XIV (61–47 B. C.) reigned jointly with his sister, the famous Cleopatra, from 51 to 47 B. C. In the latter year a dispute arose between them and the queen left Egypt. Caesar sent troops to support her, Ptolemy was defeated, and he was drowned in an attempt to escape. See Cleopatra.

Ptolemy XV (58–45 B. C.) another brother of Cleopatra, occupied the throne jointly with his sister for two years, when she murdered him to make Caesarion (her son by Julius Caesar) king.

PTOLEMY, a famous author who lived at Alexandria in the second century after Christ. Little is known of his life. He left a work on astronomy and another on geography, which were standard texts until the discoveries of the sixteenth and seventeenth centuries. According to the Ptolemaic system, the earth was a globe and the center of everything. Around it revolved the hollow sphere of the heavens. The moon and the sun revolved around the earth, but in circles of which the earth was not the center. There were seven planets, arranged according to distance from the earth in this order: the Moon, Mercury, Venus, the Sun, Mars, Jupiter, Saturn. See Copernicus; Planet.

PTOMAINES, *toh'maynz,* a class of poisonous substances of animal origin, closely resembling alkaloids in their chemical composition (see Alkaloids).

Ptomaine Poisoning is caused by eating food that is in a state of decomposition, such as canned fish, canned meat and ice cream that has stood for a long time in a tin can. The symptoms are chilliness, headache, pain in the stomach and intestines and extreme prostration, accompanied by vomiting and purging, which are nature's attempts to cleanse the system of the poison. The treatment should consist in emptying the stomach and the intestinal tract as soon as possible, and in severe cases, to prevent total collapse, the administration of stimulants other than whisky. Recovery from slight attacks is usually speedy but severe attacks may become fatal.

PUB'LIC DEFEND'ER. The Constitution of the United States provides that any person accused of crime shall have the assistance of counsel in his defense. However, it often happens that the accused has no money with which to pay a lawyer; in such cases the judge appoints some lawyer to defend the accused person. Usually the law-

yer appointed is inexperienced or lacking in ability, while the opposing state's attorney in the case is a man chosen for his position because of his ability. Under such conditions it is scarcely possible for the accused person to have a fair trial.

A *public defender* is an attorney elected by the county to defend those accused of crime, or of violation of the law, when they do not have the means for employing an attorney. The public defender may also assist working people in the collection of wages due them, and he may act as attorney in small lawsuits for citizens who cannot afford to engage regular counsel. The first public defender in the United States was appointed in Los Angeles County, Calif., in January, 1914. The plan has been copied in the police courts of Portland, Oregon, and in New York City, where it is under supervision of the Voluntary Defenders' Committee.

PUBLIC LANDS. See LANDS, PUBLIC.

PUBLIC SCHOOLS. See SCHOOLS.

PUBLIC UTILITIES, a term applied to various enterprises operated to serve the general public. The term includes railways, both steam and electric; express companies; mail, telegraph and telephone lines, and light, heat and power. Formerly all public utilities were under control of private corporations, who were bound only by the restrictions placed upon them by their franchises. Under this plan many abuses developed, and the respective governments under which the public utilities operated were compelled to assume partial control.

The Interstate Commerce Commission created in 1887 to supervise railway tariffs represented the first attempt by the United States government to exercise control over public utilities. Since that date railroad commissions have been created in almost every state, and in December, 1917, the Federal government took over the railroads as a war measure. In the following July the telephone and telegraph lines were placed under government control. After the conclusion of peace these utilities were returned to their owners, but this experiment along the line of public ownership convinced people generally that a greater degree of government supervision over public utilities, rather than government ownership, was needed in the future. In most cities the water plants are owned and controlled by the municipality, and there is a general tendency to place the street car, heating and lighting systems under like control.

PUCCINI, *poot che'ne,* GIACOMO (1858–), one of the greatest composers of Italian opera. He was born at Lucca of a distinguished family of musicians. He studied at the conservatory of Milan, under leading masters, and in 1884 produced his first opera, *Le Villi. Edgar* followed, but was unsuccessful, owing to a poor libretto. *Manon Lescaut,* his first pronounced success, was produced in 1893. It was followed by *La Bohème,* which because of its lilting melodies is one of the opera-goer's favorites. *Tosca* was slow in gaining popularity because of its libretto, but *Madame Butterfly,* which in dramatic content far surpasses all his other works, brought Puccini unreserved praise in 1904. Since this production he has written on an American theme, *The Girl of the Golden West.*

PUCK, the name given to an elf or fairy that plays an important part in English folklore. He is a joke-loving spirit, dabbling in the affairs of mortals and indulging in all sorts of pranks, sometimes helping those who have a friendly feeling for him. Puck is one of the chief characters in Shakespeare's MIDSUMMER NIGHT'S DREAM.

PUDDING STONE. See CONGLOMERATE.

PUEBLA, *pwa'bla,* or **PUEBLA DE ZARAGOZA** (formerly La Puebla de los Angeles), MEXICO, capital of the state of Puebla, on a plateau about sixty miles east of the City of Mexico. It has wide streets, spacious squares and well-built houses. The cathedral is magnificent, and there are a number of other beautiful churches. There are also several colleges, a museum, a theater and a library of more than 100,000 volumes. Puebla is one of the chief seats of Mexican manufacturing industry, and its principal products are cotton and woolen goods, glass, leather, earthenware, straw hats and paper. The city was built by the Spaniards about 1530. During the Mexican War the United States troops held the town for some time. In the civil strife of 1913 and thereafter the city was held in turn by Villa and Zapata, and finally by the forces of Carranza. Population, 1910, 101,214.

PUEBLO, *pweb'lo,* the Spanish word for *village,* was the name originally applied to the villages of certain Indian tribes living in communities of adobe, or stone-built, houses in the arid regions of Arizona, New Mexico and

Mexico. The name is now applied to the Indians themselves, who are under the protection of the government. The ruins still to be seen in various parts of the Southwest show that the Pueblos at different times wandered about, abandoning one location and settling in another. Their houses are clustered tightly together, one frequently overlapping and rising above another. Narrow and crooked alleys separate the buildings into irregular blocks. There are no openings in the walls of the lower stories, except the narrowest of window slits, but the upper floors are provided with doors and windows. These homes are entered through the roof by means of movable ladders, which are drawn up at night.

The entire village, or community, works together on enterprises of general interest, such as the construction of irrigating ditches, although each family lives in many respects an independent life. The Pueblos subsist principally by agriculture, and the women are especially adept in weaving and in the making of pottery. The men are gayly clothed with robes and jackets, elaborately decorated with tassels and fringes. In some tribes the unmarried women are distinguished by a peculiar headdress. Physically these Indians are small in stature, but are very strong. The Pueblos number about 10,000, and represent four distinct families, of which the *Zuni* and *Hopi* (which see) are the most important.

PUEB'LO, Colo., the second city in size in the state and the county seat of Pueblo County, is 122 miles nearly south of Denver, on the Arkansas River, at the mouth of Fountain Creek, and on the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the Missouri Pacific, the Colorado & Southern and the Denver & Rio Grande railroads. The city is near the eastern foothills of the Rocky Mountains, has an elevation of over 4,600 feet, and is in the immediate vicinity of extensive deposits of coal, oil and limestone. Although located in a good farming region it owes its prosperity mainly to its manufacturing and smelting interests. There are 125 factories. Its smelters treat gold, silver, copper, lead and zinc ores, while its immense steel plant, railroad shops, foundries, machine shops and other factories make it a principal manufacturing city of the Rocky Mountain region. The state asylum for the insane is located here, as is also the large hospital of the Colorado Fuel and Iron Company and several hospitals and sanitariums of lesser note. Other important institutions are Loretta Academy, Gulliford Academy, Benedictine College, the McClellan Library (in a fine Carnegie building) and the law library. Of Pueblo's numerous parks, the most important are Mineral Palace Park, which takes its name from the Mineral Palace, originally designed as a museum of mineralogy, and City Park, noted for the great variety of trees it contains. There is a Federal building and a fine courthouse.

The Mormons located here temporarily in 1846 and a trading post was established in 1850, but the traders were massacred by the Indians in 1854. The city was laid out in 1859 and secured its charter in 1873. Population, 1910, 44,395; in 1917, 56,084 (Federal estimate).

PUERTO PRINCIPE. See Camaguey.

PUFF'BALL, a species of fungus related to the mushroom. The ball grows close to the ground, springing from extensively-branching, rootlike fibers. When young, it is white and fleshy and is good to eat; when mature it bursts open at the top and discharges millions of minute spores in a brown cloud that looks like smoke. The larger balls, some of them fifteen or twenty inches in diameter, "smoke" for several days and are said to discharge spores at the rate of a million a minute. See Mushrooms.

PUF'FIN, a species of auk which migrates between the Arctic and north temperate regions. The body is about the size of a pigeon's, and the head is large. The beak is very conspicuous, and that of the male undergoes marked changes in the breeding season. Like most sea birds, these have neutral-tinted plumage, the breast and under parts being light, the wings and tail dark gray. Puffins live far out over the sea, coming to land only in the breeding season, and then in large colonies. The nests are

PUFFIN

among the rocks or in underground burrows, and in each a single egg is laid and hatched. In the far north the birds constitute a favorite article of food, and during the nesting seasons large numbers of them are captured in nets.

PUG, a small dog with a stout, compact body, weighing from ten to twenty pounds, and having a wrinkled face and short, black nose. Its hair is short and smooth, and usually fawn-colored. The tail curls upward in a tight coil over the back. The black pug is the same dog in every particular but color.

PUGET, *pu'jet*, **SOUND**, one of the largest inland harbors in the world, is an irregular inlet extending into the northwestern portion of the state of Washington, on the shores of which lie Seattle, Tacoma, Olympia, and other ports of great commercial importance because of their ocean traffic. Its shores are high and wooded, and its deep waters reflect the great expanse of scenic beauties for which the locality is noted.

Puget Sound is an inland extension of the straits of Georgia and Juan de Fuca, which separate the island of Vancouver from the mainland. The sound extends southward for about 100 miles and is divided into two branches; Hood's Canal is the western branch,

PUGET SOUND AND OUTLET

and Admiralty Inlet, the eastern branch. Puget Sound has extensive fisheries along its shores, and salmon packing and canning constitute one of the great industries of the region. See SEATTLE; TACOMA; OLYMPIA; WASHINGTON.

PUISNE, *pu'nee*, **JUDGE**, the name applied to associate judges or justices in Great Britain and some of the British dependencies, Canada, in particular. The term is derived from the old French, and means *junior*. It is used to designate the associate judges from the chief justice.

PULASKI, *poo lahs'ke*, CASIMIR (1748–1779), a Polish soldier who fought for America in the Revolutionary War. Born of a noble Polish family, at Podolia, and inspired by intense love of liberty, he fought in Poland's war for freedom and was exiled for alleged connection with a plot to abduct King Stanislas in 1771. At this time his estates were confiscated. A round of adventures in France and Turkey followed, and in 1777, after a meeting with Benjamin Franklin, he sailed for America and at Philadelphia joined the Continental army to aid in the fight for independence. He fought in the Battle of the Brandywine as chief of dragoons and was made a brigadier-general. At the head of an independent force of cavalry and light infantry, known as Pulaski's Legion, he served in the southern campaign, but was mortally wounded in a furious assault upon the city of Savannah, October 9, 1779.

PU'LITZER, JOSEPH (1847–1911), one of the greatest of American journalists, founder of the Columbia School of Journalism, was born in Budapest, Hungary. At the age of seventeen he emigrated to the United States, where he served for a time in the Union armies. He began his journalistic career on the *Westliche Post*, in Saint Louis, under Carl Schurz; of that paper he later became editor and proprietor. He was elected to the Missouri legislature in 1869, and was a delegate to the Liberal Republican convention in 1872, supporting Horace Greeley for the Presidency. Later he became identified with the Democratic party. In 1884 he was elected a member of Congress, but served only a few months. He founded the Saint Louis *Post-Dispatch* (combining the *Post* and *Dispatch*) in 1878, and purchased the New York *World* in 1883.

In 1889 Pulitzer became totally blind, but continued his editorial work as well as his art interests until a few hours before his death. His life should serve as an inspiration, for by his ambition and personality he rose from a penniless emigrant to be one of the wealthiest, most cultured publishers in

the world, vitally interested in all the finer things of life.

PUL'LEY, a small wheel turning upon an axis. The rim may be flat or grooved, according to the use to which the pulley is to be applied. The frame in which the pulley is suspended is known as the block. Pulleys are of two classes, fixed and movable.

The Fixed Pulley. The *fixed* pulley is one which does not change its position and is used simply for the purpose of changing the direction of the force applied.

Movable Pulley. A *movable* pulley is one fixed in a movable block, which rises and falls with a weight. The law of equilibrium is that the weight is equal to the power multiplied by twice the number of movable pulleys. In the single pulley, shown in Fig. 1, there is no advantage. The lever arms r and R being equal, the point B is the same distance from C, the point of support, as the point A. Therefore, the power P must equal the weight W, when they are in equilibrium. In the movable pulley, Fig. 2, the weight W is suspended by two cords, each of which sustains one-half of it; hence, if the power, P, is one-half the weight, the pulley is in equilibrium.

Pulleys are used in derricks and tackle

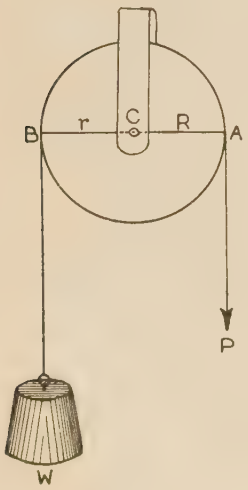


FIG. 1

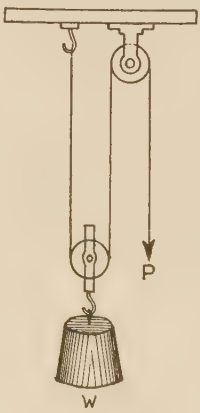


FIG. 2

blocks. In machinery the term *pulley* is applied to a wheel with a broad, nearly flat, face, used for carrying a belt which imparts motion to machinery. See MECHANICAL POWERS.

PULLMAN, GEORGE MORTIMER (1831–1897), an American inventor and capitalist, born in Chautauqua County, N. Y. At twenty-two he contracted to remove warehouses along the Erie Canal, which was to be widened. Six years later, in Chicago, he became a building contractor and raised entire blocks of brick and stone buildings. In 1859 he made a sleeping car, since developed into the car known as the "Pullman," but it was eight years before he organized the Pullman Palace Car Company and began building cars for the railroads. About the shops grew up the industrial town of Pullman, which was annexed to Chicago in 1880. See RAILROAD, subhead *Equipment*.

PUL'MOTOR, a mechanical device for forcing artificial respiration. It is used in cases of drowning, electric shock and gas poisoning. The device contains a tank of compressed oxygen connected with an injector, by means of which air is mixed with the oxygen before it is inhaled. A mask, which is placed over the patient's face, is attached to the injector. A switch worked by the operator forces the oxygen and air into the lungs.

While the pulmotor in the hands of a skilful operator is a valuable device for restoring respiration, it is the opinion of scientists who have thoroughly tested its merits that its value has been greatly overrated, and that there are serious dangers attending its use, except in the hands of a skilled operator. It may suck the air from the small air cells in the lungs and cause them to collapse, and it is liable to pump air into the stomach. Moreover, unless artificial respiration is begun within ten minutes after the patient has stopped breathing, no efforts can revive him. In case of drowning, manual respiration should be begun at once, while waiting for the device to be brought. See DROWNING.

PULQUE, *pull'ka*, or **OCT'LI**, the favorite beverage in Mexico and Central America, made from the fermented juice of the agave. It is cooling and wholesome, but if drunk in excess causes intoxication.

PULSE, THE, the wave movement of the blood through the arterial system. The movement begins in the heart, with the contraction of the ventricle which sends a volume of blood into the aorta, which is already full. The expansions of the walls of the aorta and their contraction as the blood moves on make the intermittent flow, which is easily felt in the radial artery of the wrist, in the temporal

artery of the temples and in the carotids of the neck. Any cause which affects the action of the heart affects also the pulse. In healthy adults the number of beats per minute varies from sixty-five to seventy-five, the most common rate being seventy-two. The pulse is quicker in children than in adults and slower in old age than in middle life. There is no pulse in the capillaries and veins. See SPHYGMOGRAPH.

PULSE FAMILY. See LEGUMINOUS PLANTS.

PU'MA, one of the largest animals of the cat family, called, according to locality, *mountain lion, panther* and *cougar.* Large numbers of the animals were once found in the Rocky Mountains region, but they are now comparatively rare. The adult is about six feet long and weighs 200 pounds. It is usually reddish-brown above, white on the throat, breasts and insides of the legs and black on the tip of the tail and muzzle. A black streak runs along the back. The puma lives in trees, but does not spring down upon travelers unawares, as hunters once believed it did. It is less dangerous than other wild cats of its size, and does not often attack man. However, it is detested by ranchmen because of its destructiveness to domestic animals, especially sheep. One puma alone may kill a hundred sheep in a single raid.

PUMICE, *pum'is,* a volcanic rock of various colors, gray, white, reddish-brown or black, composed chiefly of glass. It is hard, rough and porous; it is lighter than water and consequently floats, and resembles the slag produced in an iron furnace. Pumice is really a loose spongy, frothlike lava. It is used for polishing ivory, wood, marble, metals and glass, and for smoothing the surfaces of skins and parchment.

PUMP, a device for raising liquids or removing gas from a closed vessel. The necessary parts of a pump are the barrel, the piston, the piston rod, the valves and the suction pipe. There are numerous patterns of pumps, but these can all be grouped under the following classes: suction pumps, including lift pumps and force pumps and centrifugal pumps.

The Suction Pump. This is the common household pump. It consists of a piston fitted to work air-tight in the barrel, and contains a valve opening upward. It is connected by a piston rod with the handle, by which it is moved up and down. At the bottom of the barrel is another valve, also opening upward and closing the upper end of the suction tube. When the piston moves downward, the air in the barrel is forced up through the valve in the piston. As the piston rises, the pressure of the air closes this valve, and a partial vacuum is produced in the barrel. The water is forced upward in the suction pipe by the pressure of the air upon its surface in the cistern or well. The first few strokes of the pump exhaust the air from the barrel and the suction tube. As the air is exhausted the water continues to rise until it reaches the barrel. It is then pumped

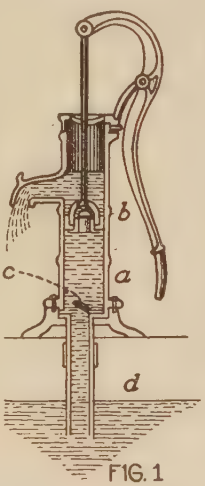


FIG. 1

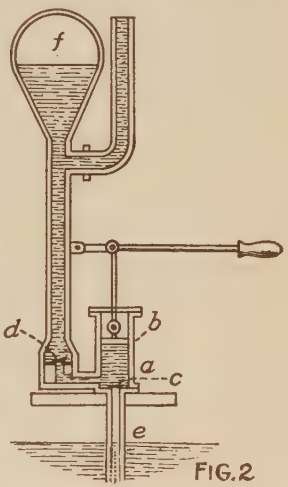


FIG. 2

MECHANISM OF PUMP

a Barrel	a Barrel
b Piston	b Piston
c Valve in Barrel	c Valve in Barrel
d Reservoirs	d Valve in Stand Pipe
	e Reservoir
	f Air Chamber

out in the same manner that the air was exhausted. Under the most perfect conditions this pump cannot raise water over 28 or 30 feet, and it will seldom work satisfactorily for more than 24 feet.

The Lift Pump. This pump also has two valves and a piston above, opening upward, but it differs from the suction pump in being placed in the bottom of the cistern or well from which the water is to be raised, and in its ability to raise water to any desired height, while the efficiency of the suction pump is limited by the pressure of the air.

The Force Pump. There is in this pump no valve in the piston, but it has a valve opening outward at the point where the delivery tube is attached to the barrel. Most force pumps are double-acting—that is, they

have two pistons—and the water is forced from the pump into an air chamber, from which the elasticity of the compressed air draws it in a continuous stream.

Centrifugal Pumps are employed where the lift is not too great and the quantity of water is considerable. The common form consists of a wheel, shaped like an ordinary fan, with passages leading from its center to its circumference. This is made to rotate very rapidly in the casing. The circumference communicates with the delivery pipe, and the center connects with the pipe leading to the water supply. The rapid revolution which is in the wheel causes the water to flow from its center to its circumference, and in this way sucks the water up to the center of the wheel, from which it is carried to the circumference and thence out through the tube.

The Chain Pump. This is a pump with an endless chain passing over two wheels, one at the top and the other at the bottom of the well or cistern. The chain contains circular disks that fit a tube through which the rising part of it moves when the wheels are turned. The lower end of this tube sits in the water, and as the chain continues to move it carries the water between the disks to the top of the tube, where it flows out through a spout. The chain pump is used to a very considerable extent in the country for raising water from wells and cisterns. In the bucket pump, small buckets are attached to the chain, and the tube is not necessary. As the buckets turn over the upper wheel they empty their contents into the spout.

PUMPKIN, a coarse climbing plant and its fruit, a native of India, but cultivated in America and most parts of Europe. The fruit, which is of a reddish or golden yellow, sometimes acquires a diameter of two feet. It has a tough, stringy pulp, which when cooked with other ingredients makes a delicious filling for pies. On Hallowe'en it is the custom to use the pumpkin shell for jack-o'-lanterns.

PUNC'TUATION, the use of certain symbols in written and printed composition for the purpose of making the thought clearer. Punctuation marks are placed between whole sentences and within sentences to separate the different parts. There are no punctuation marks in the old Greek and Roman manuscripts; even the words are not separated. This running of all the words together makes them very difficult to read. First of all, authors began to correct this by separating the words, either by spaces or by dots. Next, they learned to place a full stop after sentences, but it was not until the beginning of the sixteenth century that a real system of punctuation was devised; our present marks are in a great degree due to the wisdom and invention of Aldus Manutius, a Venetian, who died in 1515. The principal marks of punctuation used at present are the period (.), the colon (:), the semicolon (;), the comma (,), the interrogation point (?), the exclamation mark (!), the dash (—), and the parentheses (()).

PU'NIC WARS, the name given to three great wars waged between Rome and Carthage. The first lasted from 264 to 241 B. C., the second from 218 to 201 B. C., and the third from 149 to 146 B. C. In all three of these struggles the Romans were victorious, in the first gaining Sicily, in the second acquiring Spain, and in the third completely crushing the enemy's power and establishing their own world supremacy.

Related Articles. Consult the following titles for additional information:

Carthage	Rome
Hamilcar Barca	Scipio, Publius
Hannibal	(father and son)

PUNJAB, *pun'jahb*, a province in the northwestern part of British India. The name, meaning "five rivers," refers to five important streams that drain the region it occupies. The area of the Punjab is 133,741 square miles, of which 99,779 square miles are under a British lieutenant-governor; the remainder is administered by native rulers under British suzerainty. See INDIA.

PUNTA ARENAS, *poon'tah ah ra'nahs*, CHILE, the most southern city of the world, is situated on the Strait of Magellan at the south end of South America, in latitude 53° 10′ south. It is 1,414 miles from Valparaiso, Chile; 3,928 miles from Panama; 6,184 miles from San Francisco; 6,980 miles from New York, and 4,036 miles from Cape Town, Africa. It is the capital of the Chilean territory of Magallanes, and is important as a coaling station for steamships. The seal fisheries are of some value. Punta Arenas is a town of muddy streets and log houses. It was founded in 1849, on the site of a former penal colony. Population, 1915, 10,500.

PU'PA, the intermediate form between egg and insect in the life history of certain

small creatures. The butterfly lays an egg which develops into a worm; and the worm encloses itself in a chrysalis, from which a butterfly emerges. In this casing the animal is a pupa. In a cocoon the moth is in its pupal stage. See BUTTERFLY; COCOON.

PURDUE' UNIVERSITY, a state institution of higher learning, established at Lafayette, Ind., in 1869. The university is really an institute of technology and comprises schools of mechanical, civil and electrical engineering, agricultural science and pharmacy. All students are required to spend an average of three hours a day in laboratory, shop or field. The faculty numbers about 200, and there are over 1,600 students. The library contains 50,000 volumes.

PURE FOOD LAWS are laws intended to safeguard the purity of drugs and foods. To mix unwholesome substances in anything intended for food is an offense against the law. Most states, in furtherance of public health, prohibit by statute the sale of adulterated or misbranded foods and drugs, and Congress enacted a federal pure food law in 1906.

In general terms, products are considered adulterated if unhealthful ingredients have been added or wholesome ingredients generally used withheld; if they do not attain a certain recognized standard of purity and strength, or if prepared from unwholesome ingredients, or by the employment of unsanitary methods; if, to prevent decay, noxious means and preservatives are used; or if such products constitute an imitation of some other commodity. Products are regarded as misbranded if the labels on the packages or cans convey misleading information.

In the enforcement of the federal law, questions requiring the most painstaking investigation are constantly rising. It is found that benzoate of soda and a number of aniline dyes, when pure, are harmless. The benzoate of soda may be used as a preservative, and these dyes may be used for coloring. But we should remember that preservatives should not be used, because preserved food is likely to be of an inferior quality. This statement, however, does not apply to the use of salt and smoke for preserving meats. See ADULTERATION.

PUR'GATORY, an intermediate state between earth and heaven, according to Roman Catholic belief, in which the souls of those who die penitent are purged of pardonable sin. It is believed that souls in purgatory are benefited by earthly prayers offered in their behalf.

PU'RITANS, a name first given about 1564 to those who wished to reform the Church of England. Queen Elizabeth, though upholding the national Church, had retained many of the ceremonies and vestments of Roman Catholic Church worship and had thus antagonized a large part of the Protestant party, who wished to have the Anglican Church differ more decidedly from the Roman Catholic. At the close of her reign, the Puritans were of three classes—those who desired a changed worship but wished to remain in the Church; those who wished to adopt Calvinism as the Established Church, and those who did not believe in the Established Church, but thought that each congregation should govern itself. These were led first by Robert Brown and were known as Brownists, but later were more generally called Separatists or Independents.

The Puritans gained in strength in the reigns of James I and Charles I, in spite of great efforts to overthrow them, and they took the leading part in the Civil War, which resulted in the establishment of the Commonwealth. With the restoration of the Stuarts in 1660, the Act of Uniformity placed the Puritans in the position of dissenters, and many emigrated to America, whither a large number of their comrades had already gone as early as 1620. Plymouth and Massachusetts Bay, New Haven and Connecticut were in the beginning Puritan commonwealths.

Conspicuous characteristics of the Puritans were unswerving devotion to duty and love of righteousness. Often they were narrow and intolerant. See PILGRIMS; MASSACHUSETTS, subhead *History*.

PURSLANE, *purs'layn*, commonly called *pursley* or *pusley*, a trailing weed, a pest in gardens, found in all warm parts of the world. It is a short-lived annual, with small yellow flowers that open only in the early part of the day. Purslane is used in some parts of the world in salads, and in France its young shoots are pickled like gherkins.

PUTNAM, ISRAEL (1718–1790), an American soldier, born at Old Salem, Mass. When the French and Indian War broke out he joined the army and rendered good service throughout the war. He was taken prisoner by the French and fell into the hands of the

Indians, who tortured him cruelly. In the disturbances which led up to the Revolutionary War, Putnam showed himself a most determined opponent of British aggressions, and when the war broke out he joined the army. He was present at Bunker Hill and later destroyed much British shipping on the expedition to Noddle's Island. In 1775 he commanded the army at Long Island, and in the following year took part with Washington in the operations in New York and New Jersey. Hartford, Conn., erected a fine monument to him, the work of J. Q. A. Ward.

PUTNAM, RUFUS (1738–1824), an American soldier and frontiersman, born at Sutton, Mass. He fought in the last French and Indian War, served in the Revolutionary War, part of the time as an engineer and part in active military service, winning the rank of brigadier-general. In 1786 he organized, with Benjamin Tucker, Manasseh Cutler and others, a company of revolutionary veterans for the purpose of settling the district of Ohio, and he was one of the three directors of the Ohio Company. Partly through his influence, Congress passed the Ordinance of 1787, establishing a civil government in the territory. In the same year it sold to the Ohio Company a million and a half acres at the junction of the Muskingum and Ohio rivers. There, in the following year, Putnam established the town of Marietta. In 1796 he became surveyor-general of the United States.

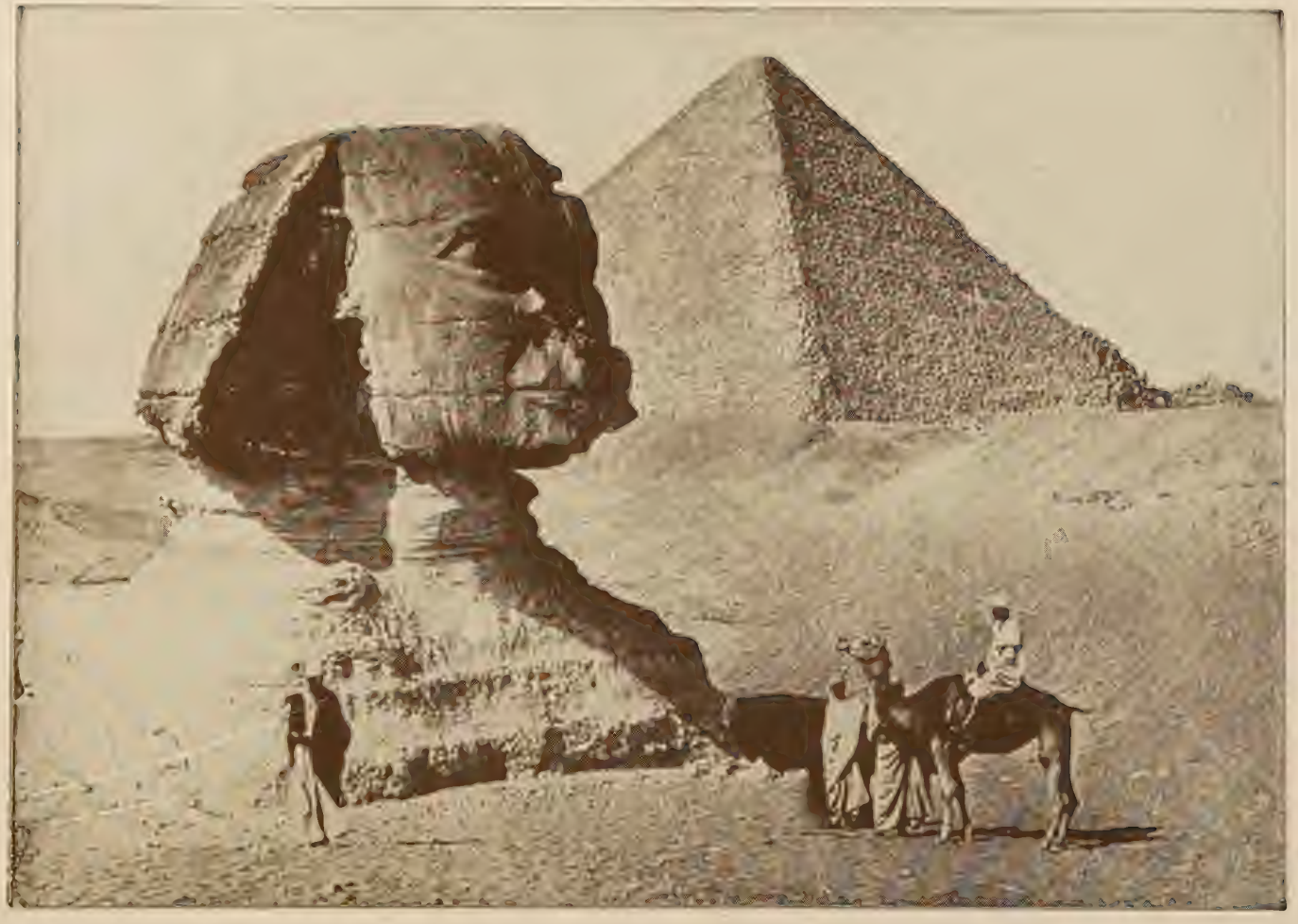
PUTREFAC'TION, the decomposition of dead organic matter, which is usually accompanied by the rise of ill-smelling gases. It is now known to be due to the agency of bacteria or other organisms, which find their way to the dead matter and multiply rapidly therein. The substances in which these bacteria are thus developed separate into their original elements or are reduced to much more simple compounds. The decay of animal substances is usually accompanied by more poisonous and fetid exhalations than come from the decay of vegetable products. Ammonia or ammoniacal compounds and other combinations of hydrogen, together with other highly infectious vapors and gases, are formed in most cases of animal putrefaction. Chlorine will usually render these harmless. The rapidity of putrefaction and the nature of its products are to a great extent dependent upon temperature, moisture and the access of air. Substances decay most rapidly in a temperature of between sixty and eighty degrees, where there is considerable humidity and a free access of air. Putrefaction, then, may be checked or altogether prevented by a very high or a very low temperature, by excluding the air and by keeping the body dry. Certain antiseptics prevent, and to some extent arrest, the progress of putrefaction. See BACTERIA AND BACTERIOLOGY; FERMENTATION.

PUTTY, a cement made by mixing whiting (chalk) with linseed oil. It is used by glaziers to fix glass in position and by painters to fill cavities in wood surfaces. A putty used as a finishing coat in plastering is prepared with slaked lime, dried to the consistency of soft dough and mixed with plaster of Paris. A putty used by mechanics in making pipe joints, called *red-lead putty*, is made of powdered red lead mixed with boiled linseed oil.

PYGMALION, *pig ma'le on*, a legendary Greek sculptor. He shunned women, because all of them fell short of his ideal. He made a life-sized statue embodying in it his ideas of womanly grace and beauty, and when he had finished it the form was so exquisite he fell in love with it. He prayed fervently that his ideal might be made real and that the woman of his dreams might be endowed with life. His prayer was answered, and one day Galatea, his lovely creation, stepped down from her pedestal and became his wife.

PYGMIES, *pig'miz*, a race of dwarfs, first mentioned by Homer in the *Iliad* as dwelling in a region far to the south and as having to sustain a war against the cranes every spring. Later writers trace them as native to the interior of Africa. Pygmies are divided into two groups—the African and the Asiatic, the latter called Negritos. They somewhat resemble apes in facial appearance, and have the habits of a primitive people. They live in huts made of branches and foliage and subsist by hunting and fishing.

PYLE, HOWARD (1853–1911), an American illustrator and author, whose illustrations for children's books, pictures of the sea and of colonial scenes have an individuality and originality which give them a distinct place in American art. Pyle was born in Wilmington, Del., and he studied art in Philadelphia and in New York. For a time he was an instructor in Drexel Institute, Philadelphia; later he settled permanently in New



THE SPHINX AND THE GREAT PYRAMID

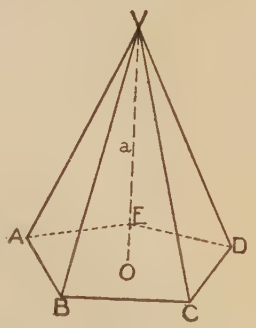
York, but died in Florence, Italy. He was one of the foremost of American illustrators, gifted with a keen sense of humor, a bold and original imagination and distinct literary ability. His best work was done for children. Among the books he wrote and illustrated are *Merry Adventures of Robin Hood, Twilight Land, The Champions of the Round Table* and *The Story of Sir Launcelot.*

PYM, *pim,* JOHN (1584–1643), an English statesman who was foremost in opposition to the tyranny of Charles I. He was born at Brymore, in Somersetshire. While a member of the Parliament of 1621 he attracted attention by his stand against the royal encroachments on Parliamentary privileges. In the first three Parliaments of Charles I he was also prominent, and on the assembling of the Short Parliament, in 1640, was recognized as its leader. The refusal of Parliament to grant supplies to Charles I until certain reforms had been promised was instituted under Pym's guidance. The impeachment of Strafford and the trial of Laud, undertaken by the Long Parliament, were conducted under his direction, and he was one of the five members whom Charles attempted to arrest. He died before the civil war between the king and Parliament had progressed far.

PYORRHOEA, *pi o re'a,* a disease which causes the gums to swell and the teeth to become loose. It is an infection of the sockets to which the roots of the teeth are attached, and if not checked makes extraction of the teeth necessary. Pus also forms in the diseased tissue and this is itself a source of infection, often causing grave organic diseases. Persons with a tendency to pyorrhoea may avoid it by giving scrupulous attention to the care of the teeth. If a case develops a reliable dentist should be consulted at once.

PYRAMID, *pir'a mid,* a geometric solid, whose base is a polygon and whose sides are triangles meeting in a common point called the *vertex.* Pyramids are said to be triangular, quadrangular, pentagonal, etc., according as their bases are triangles, quadrilaterals, pentagons, etc. The pyramid is called *right* or *regular* when its base is a regular polygon and a perpendicular dropped from the vertex to the base will pass through the center of the base. The volume of a pyramid is equal to one-third the area of its base multiplied by the perpendicular distance from the vertex to the base, called the *altitude.*

To find the relation between a pyramid and a prism, construct a prism of cardboard, then construct a pyramid having an equal base and altitude. Fill the pyramid with sand and empty it into the prism. It will require three pyramids full of sand to fill the prism. Since the sides of a pyramid are triangles, (as ABV), its lateral area is equal to the product of the perimeter (ABCDE) by one-half the height of the triangle, which is a line extending from the middle point of the side to the vertex and is known as the *slant height.* When the base of a pyramid is an equilateral triangle, and all its faces are equilateral triangles, it is called a *tetrahedron.* This figure is one of the five regular geometric solids.



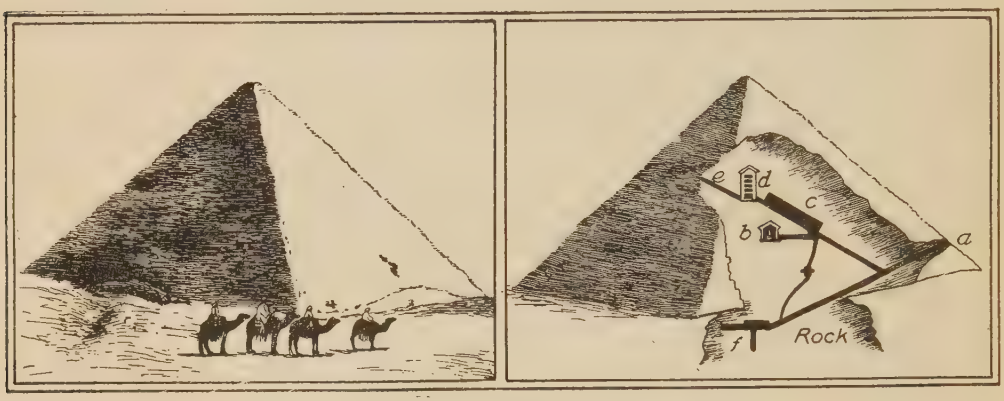
PYRAMIDS, the royal tombs of ancient Egypt, "the highest, costliest, and cruelest tombs the world has ever seen." The largest and most remarkable of the Egyptian pyramids occur in several groups on the west side of the Nile, on the border of the Libyan desert, extending for a distance of about twenty-five miles from north to south. There are about seventy-five in number, built chiefly of the hard limestone of the adjacent hills, although large blocks of granite brought from a distance also were used.

The most celebrated of the pyramids, a group of three near Gizeh, were numbered among the Seven Wonders of the Ancient World. These are located four miles southwest of Cairo, in the neighborhood of ancient Memphis. The largest, erected by Cheops (Khufu), is called the Great Pyramid; Chephren (Khafra) and Mycerinus (Menkauru) built the others.

The Great Pyramid is said to contain 2,300,000 stones, ranging in weight from two and one-half tons to fifty tons each. According to Herodotus, Cheops employed 100,000

men for twenty years to complete the building of this pyramid alone. Its base forms a square, each side of which was originally 768 feet, though now, by the removal of the coating, it is only 750 feet long, and covers a space of 13 acres. The outer surface forms a series of steps, each of the average height of three feet or more. When the structure was perfect, this step formation was hidden by the coating which rendered the sides quite smooth, and the apex, where there is now a space of twelve square yards, was no doubt originally quite sharp. The height, originally about 480 feet, is now only 451 feet, through the slow processes of destruction.

In Other Parts of the World. Ruins of pyramids are to be found at Benares, in India and in other parts of the East. Certain monuments of the ancient inhabitants found in Mexico are also called pyramids. These seem to have been intended to serve as temples, the tops being flat and surmounted by a house, or chamber, in which sacred rites were probably performed. The largest, and perhaps the oldest, is that of Cholula, in Central Mexico, said to have a base of 1,770 feet and a height of 177 feet. However, when pyramids are referred to, those of Egypt are almost invariably brought to mind.



PYRAMIDS
The Great Pryamid of Cheops, or Chufu.
a Entrance c Grand Gallery e Air
b Queen's Chamber d King's Chamber f 592 feet from top

The interior, entered forty-nine feet above the base of the north face, contains several chambers, one of which, called the King's Chamber, is thirty-four and one-half feet long, seventeen feet wide and nineteen feet high, and contains a sarcophagus of red granite. About 350 yards southwest of this pyramid is the celebrated Sphinx, described elsewhere in these volumes.

The second pyramid is 690 feet square and 447 feet high; the third is only 354 feet square and 203 feet high and is the best constructed of the three.

It is believed that when a king ascended the throne, he began to build a small tomb for himself, each year adding to it a fresh coating of stone, so that at his death the sides of the pyramid were like long flights of stairs. After the body of the king had been laid in the innermost chamber, the door was walled up and the smooth sides of the pyramid made his finished tomb.

PYR'AMUS AND THIS'BE, a pair of devoted lovers of Babylon, who were prevented by their parents from meeting openly and were therefore in the habit of secretly conversing through an opening in the wall of their adjoining houses. They agreed one day to meet at the tomb of Ninus, and Thisbe, who was first at the meeting-place, was surprised by a lioness and took to flight. In her haste she dropped her garment, which the lioness seized in her bloody jaws. Pyramus appeared shortly afterward, and concluding from the blood-besmeared robe that Thisbe was dead, killed himself. Thisbe on her return found the body of her lover and in despair put herself to death. The story, as told by Ovid, was very popular in the time of Shakespeare, who made it the subject of the burlesque interlude in *A Midsummer Night's Dream*.

PYRENEES, *pir'e neez*, a lofty mountain range of Europe, the crest of the main chain of which forms the boundary between France

and Spain. It extends from the Mediterranean to the Atlantic; its length from Cape Creux, on the Gulf of Lyons, to Fuenterrabia, on the Bay of Biscay, is about 270 miles, and its greatest breadth is little more than fifty miles. It consists of two lines, which form parallel ridges about twenty miles apart, except in the center, where the distance between them is considerably greater. The descent on the south side is much more abrupt than on the north. The loftiest summits are nearly all near the center, where the culminating point, the Pic d'Anethou, reaches a height of 11,168 feet. In the Pyrenees is to be found some of the finest scenery in France. The climate is mild, and the snow line is over 1,000 feet higher than that of the Alps. The chief passes of the Pyrenees are the Col de Somport and the Col de la Perche. In 1919 a Franco-Spanish tunnel under the mountains was completed. Its terminals are Aix, France, and Puigcerda, Spain, which are about twenty miles apart.

PYR'ITE, or **PYRITES**, *pir ri'teez*, in mineralogy, a term applied to the combination of iron, copper or arsenic with sulphur, forming a sulphite. The word means *flint*, or a stone that strikes fire, and the name is applied to this class of minerals, because of the fact that when struck with steel or some other hard substance, a spark usually results. In ordinary usage, the term is confined to *iron pyrite*, which is a compound of iron and sulphur. It has a bright luster and a brassy, yellowish color, and because of this it is often mistaken for gold. The mineral occurs in crystals in the form of cubes and in mass; it is also sometimes found in fine grains in decaying rock. It is used in the manufacture of sulphuric acid and green vitriol, or copperas. *Copper pyrite* is sometimes smelted for the metal, and some deposits contain more or less gold and silver.

PYROM'ETER, an instrument used for measuring high degrees of temperature. The old style pyrometer, and one still found in physical laboratories, consists of a metallic bar, fixed in a frame so that when heated it will extend in one direction. The movable end is connected with a needle, which passes over a dial. As the bar extends, it moves the needle, and this indicates the degree of heat applied. This instrument is of no particular value, except to indicate the expansion of metals. Another pattern in general use and much more successful than the former consists of a metallic tube with a bulb containing air, pressing against a column of mercury which it supports. The temperature is measured by the expansion of the air. The higher the temperature, the greater the expansion, and, consequently, the greater the extent to which the mercury in the tube will rise. Still another pattern consists of a coil of platinum wire, encased in a porcelain or fire clay tube. The degree of heat is indicated by the resistance which the wire affords to the passage of an electric current, this resistance being measured by a galvanometer.

PYROTECHNY, *pir o tek'ny*, the science of making fireworks, combustible and explosive material usually contained in a pasteboard case. The materials chiefly used are niter, sulphur and charcoal, chemicals being added to produce colored lights or scintillations in burning. See FIREWORKS.

PYR'OXENE, or **AUCITE**, a mineral composed of silica, calcium and magnesium, often combined with iron, and sometimes with zinc and manganese. It occurs in prismatic crystals and also in granular form. There are colorless varieties, to each of which a specific name is given, but they are of no special interest except to the mineralogist. The varieties containing aluminum and small quantities of potash, soda or lime are of a dark color and constitute some of the common minerals. They are found crystallized in limestone and other common rocks. Pyroxene is an important constituent of many igneous rocks, and with labradorite or magnetite it forms basalt.

PYROX'YLIN. See GUNCOTTON.

PYRRHUS, *pir'rus*, (318–272 B. C.), king of Epirus, one of the most illustrious generals of antiquity. He was placed on the throne of his deposed father when twelve years old, but was banished in 302. He fought in the Battle of Ipsus, went to Egypt as a hostage for Demetrius, and there married the stepdaughter of Ptolemy Soter. Afterwards he returned to Epirus, regained his throne and planned the conquest of Macedonia, of which country he became joint ruler, with Lysimachus, in 287, and from which he was shortly driven.

In 281 Pyrrhus went to the assistance of the Tarentines, a colony in lower Italy, in their struggle with the Romans, and in 279 won his celebrated "Pyrrhic victory," at the Battle of Asculum—an engagement in which his losses were so heavy that he exclaimed,

"Another such victory and I shall be ruined." As an ally of the Sicilian Greeks at war against Carthage he was defeated, in 275. He returned to Greece, and again attempted the conquest of the Macedonians and the subjugation of the Peloponnesians. In a campaign against the latter he was killed.

PYTHAGORAS, *pith ag'o ras,* (about 584–510 B. C.), a Greek philosopher and mathematician, of whose life little is known. It is thought that he was born at Samos, that he traveled extensively and studied in many lands. About 530 B. C. he settled in the Greek city of Crotona, in lower Italy, and there founded among the aristocracy a brotherhood which became famous. The Pythagoreans believed in the transmigration of the soul and taught self-restraint, temperance, obedience and simplicity. They did much for the study of mathematics.

It is quite certain that Pythagoras discovered the proof of the proposition that the square on the hypotenuse of a right triangle is equal to the sum of the squares on the other two sides. This is known as the *47th problem in Euclid,* or the *Pythagorean theorem.* The Pythagoreans were looked upon with suspicion, and in a popular uprising many of them were killed. There is reason for believing that Pythagoras had withdrawn to Metapontum and escaped the fate of his friends.

PYTHAGO'REAN THEOREM, a famous proposition enunciated by Euclid, forming the forty-seventh theorem in the first book of his *Elements.* It proves that the square on the hypotenuse of any right-angled triangle is equal to the sum of the squares on the other two sides.

PYTHIAN GAMES, *pith'i an,* one of the four great national festivals of the Greeks, instituted in honor of Apollo and celebrated at Delphi. Until about 586 B. C. they were under the management of the priests of Delphi and took place every ninth year; afterwards they were conducted by the Amphictyons and were celebrated every fourth year. Prizes were given for flute playing, for athletic sports and for horse and chariot racing. Eventually, contests in tragedy, painting, sculpture and other intellectual and artistic accomplishments were added. At first, prizes of silver or gold were awarded, but later the laurel wreath and palm branch were substituted. These games continued to be celebrated until the end of the fourth century of our era.

PYTHIAS. See DAMON AND PYTHIAS.

PYTHIAS, KNIGHTS OF. See KNIGHTS OF PYTHIAS.

PYTHON, *pi'thon,* an enormous snake, one of the most powerful creatures of the tropical forests of Asia, Africa and Australia. The reptile often weighs many hundred pounds and measures about thirty feet in length. It is possessed of terrific strength, and though it has no poison fangs it is feared by even tigers and buffalo, which it has been known to overcome by squeezing. It lives in trees, usually near streams, and seizes the small animals it feeds on when they come to drink. Animals as large as sheep it swallows whole, first crushing the bones and mangling the body into a sausage-shaped mass. The female lays about a hundred eggs, coils herself over them and there remains, without food, until they are hatched—a period of about two months. Some of the pythons are beautifully-colored. On the western coast of Africa they are venerated by certain tribes and are cared for in temples.

PYTHON, in Greek legend, a huge serpent born of the slime and slough which remained on the earth after the great deluge which destroyed all mankind except Deucalion and Pyrrha. He lived in a cave on Mount Parnassus, and preyed upon domestic animals and even human creatures. Finally Apollo killed him with his golden darts. The famous statue of the Apollo Belvedere represents Apollo just after he has slain the python. This myth is doubtless a mere personification of natural phenomena. The python represented the stagnant pools and marshes which breed malaria, and Apollo represented the sun which dries up such pestilence-breeding spots.

PYXIE, FLOWERING MOSS, or **PINE-BARREN BEAUTY,** a small evergreen trailing plant, common in New Jersey and North Carolina. It is one of the most beautiful of the early spring plants. Its slender stems, which extend over the ground in all directions, bear small evergreen leaves, which are, however, almost hidden by the flowers. The buds are pink; the open flowers, waxy white.

Q

Q, the seventeenth letter in the English alphabet, a consonant having the same sound as *k* or hard *c*. It is a superfluous letter in English, as the combination *qu*, in which it always occurs, could be equally well expressed by *kw*, or by *k* alone when the *u* is silent. It came originally from the Phoenician alphabet, in which it was called *qoph*. The Greeks did not use it because they had no need for it, but the Romans revived the letter and employed it in the same manner as it is used to-day.

QUADRANT, *kwahd'rant*, an apparatus once employed in navigation and in surveying. It was variously constructed, and had a graduated arc of 90°, or one-fourth of a circle, hence the name. It was used in determining angular altitudes, a service now performed by the sextant (which see).

QUADRILATERAL, *kwod ri lat'er al*, a plane figure having four straight lines. A *trapezium* is a quadrilateral no two sides of which are parallel; a *trapezoid* is a quadrilateral two sides of which are parallel; and a *parallelogram* is a quadrilateral in which the pairs of opposite sides are parallel. Three classes of parallelograms are important—the rectangle, all the angles being right angles; the rhombus, none being right angles and the adjacent sides equal; and the rhomboid, none of the angles being right angles and the adjacent sides unequal. See POLYGON.

QUADRILLE, *kwahd ril'*, a dance of French origin, which consists commonly of five consecutive figures or movements, danced by four couples. It was introduced into England in 1815 and from that country was taken to America.

QUADROON, *kwah droon'*, the name given to a mixture of European and negro races, of three-fourths white and one-fourth black blood. The first mixture is called *mulatto;* the second, *tierceroon;* the third, *quadroon;* the fourth, *quintroon*, etc.

QUADRUPLE, *kwahd ru'p'l*, **ALLIANCE**, a league formed in 1718 by Great Britain, France, Austria and Holland in opposition to Spain, when that country seized Sardinia and Sicily and thus jeopardized the balance of power in Europe.

Another Quadruple Alliance was formed in 1840, by Great Britain, Austria, Russia and Prussia, for the purpose of curbing the power of Mehemet Ali. The alliance between Germany, Austria, Turkey and Bulgaria in the World War is sometimes given that name.

QUAESTOR, *kwes'tor*, the title given to a magistrate in ancient Rome. The earliest quaestors conducted the prosecution of a certain class of criminals. Later quaestors were entrusted with the charge of the public treasury. For centuries there were only two quaestors, but as the Roman republic increased in size more were added; in the time of Caesar there were forty.

QUAIL, a small game bird. Several species are found in America, the best known

CALIFORNIA QUAIL

being the *bobwhite,* so named in imitation of its call. This bird ranges throughout the eastern part of the continent, from the Gulf of Mexico into Canada. It is nearly a foot long, and is very plump. The plumage on the upper parts is reddish-brown mingled with black, buff and gray; the cheeks, throat and under parts are white. Bobwhite lives on and near the ground, rarely perching on branches, and feeds on berries, seeds and such. From ten to eighteen eggs are laid in a nest among the grasses. The several species of quail in the South and West in some respects differ markedly from the Eastern birds. The peculiarity of the California quail is a crest of six feathers, erect and curved. Nearly all quails are finely-flavored and are in demand for the table.

QUAKERS, or **SOCIETY OF FRIENDS,** a religious sect founded in England in 1648 by George Fox. The name "Quaker" was applied to them because of Fox's exhortation to "tremble at the word of the Lord." Their belief, as originally announced and not materially changed to this day, differs but little from the main creeds of orthodox believers.

From the first the Quakers were persecuted and many emigrated to America. In 1827, Elias Hicks, a Quaker of great influence and strong mental gifts, created a schism among the denomination in the United States by denying the immaculate conception, the divinity of Christ and the inspiration of the Scriptures. Many Quakers became converts of Hicks, and they have since been known as Hicksite Quakers, while the adherents to the old faith are called Orthodox Quakers. In England the denomination has greatly diminished in later years.

The Quakers are marked by a number of peculiarities, both in their method of worship and in their ways of life. They have no ordained preachers, and in their meetings each individual speaks "as moved by the spirit." They do not baptize nor partake of the Lord's Supper, and they keep no holy days except Sunday. The congregation is divided according to sex, the men sitting on one side of the "meeting-house" and the women on the other. It is the duty of the women to inspect and relieve the wants of the poor of their own sex and to look after proposals for marriage. The Quakers neither take nor administer oaths, and they object to war, no matter how justifiable it appears to be. All questions of discipline and executive management are settled in meeting; but the government of the body is exceedingly simple, and it is seldom that any serious differences occur among its members. Their number in the United States is about 117,000.

QUANTITY, *kwahn'ti ti,* the property by virtue of which anything can be measured, increased or diminished. In mathematics numbers are symbols representing quantities (see NEGATIVE QUANTITY; ALGEBRA). In music, by quantity is meant the relative temporal length of a note; in prosody, the term denotes the temporal length of a syllable.

QUAPAW, *kwah'paw,* Sioux Indian tribe, better known as the Arkansas, now consisting of a few hundred persons living upon a reservation in Oklahoma. The Quapaws were relatives of the Kaw, Ponca and Osage tribes. See SIOUAN INDIANS.

QUARANTINE, *kwahr'an teen,* a term now used to signify the isolation of persons, places, animals and effects likely to spread infectious disease, the period of quarantine depending upon the nature of the disease. Originally the term referred to the period of forty days during which a ship coming from a port suspected of contagion, or having a contagious sickness on board, was forbidden intercourse with the place at which she arrived.

National Quarantine. By act of Congress passed in 1888 national quarantine stations were established; and it is made a misdemeanor punishable by fine or imprisonment, or both, for the master, pilot or owner of any vessel to enter a port in violation of the act or of regulations framed from time to time under it.

State and Municipal Quarantine. In most of the states and cities of all countries a house or a whole town may be quarantined and its inhabitants prevented from leaving. The laws are very strict, as is usual concerning homes containing cases of diphtheria, smallpox or scarlet fever. General government regulations provide for the protection of a country as a whole, each smaller division of which takes steps to defend itself individually against infectious diseases.

QUARRY AND QUARRYING. A quarry is an open excavation from which stone is taken for building and engineering purposes, and *quarrying* is the process of loosening and removing the stone.

Quarrying. The objects to be attained in quarrying are to obtain the largest quantity of stone with the least waste and at the least expense. Three methods are in general use. They are known as the *plug and feather,* the *explosive* and the *channeling* methods. The method employed in any quarry depends upon the structure of the rock and the purposes for which it is to be used. All rocks are divided into two great classes, stratified and unstratified. Limestone and slate are good examples of stratified rock; granite and porphyry, of the unstratified. Stratified rock breaks more easily along the seams between layers than in any other direction, while the unstratified breaks about as readily in one direction as in another.

The Plug and Feather Method. This method is used when it is desired to secure blocks of stone of a given size and shape. It consists in drilling a series of small holes (about three-fourths inch in diameter) and a few inches apart, along a line that has been marked on the ledge. Into each hole a plug or wedge and two "feathers" are placed, one on each side of the wedge. The feather is a piece of steel, flat on one side and round on the other. The plugs and feathers are then slowly driven into the holes, the workmen striking them in succession, so that the pressure will be uniform all along the line. The force exerted by the plugs splits the stone. The block thus separated may be split into smaller blocks by further use of the same method, or it may be fashioned in other ways.

The Channeling Method. This makes use of a machine which cuts narrow grooves or channels in the rock, and in this way separates the block from the parent ledge. Sometimes the process of *undercutting* or drilling a series of holes under the block to be separated, is used to assure a perfect block. Channeling is in general use in the large marble quarries, since marble is too soft to withstand the pressure from the plug and feather system.

The Explosive Method, a method used when the quarryman desires to loosen a large quantity of rock or to break the rock into small fragments. A number of deep holes are drilled into the rock and a charge of explosive is placed in each and connected with an electric battery. The nature and quantity of explosive depend upon the result desired, and a degree of skill gained only through long experience is necessary to enable the quarryman to use just the right quantity. If the object is simply to loosen the stone in large blocks a slow explosive like gunpowder is employed. If, on the other hand, the purpose is to break the rock into small fragments, dynamite is employed.

Related Articles. Consult the following titles for additional information:

Blasting	Granite
Building Stone	Limestone
Dynamite	Marble
Explosives	Sandstone

QUART, *kwawrt,* a measure of dry and liquid capacity in the English system of weights and measures. As a unit of dry capacity it contains 67.2 cubic inches, is divided into two pints and is approximately equivalent to 1.101 liters. As a unit of liquid measure it contains 57.75 cubic inches, is also divided into two pints and is approximately equivalent to .9463 liters. See WEIGHTS AND MEASURES; METRIC SYSTEM.

QUAR'TER-DECK, that part of the upper deck of a ship lying between the stern and the mainmast, and on warships reserved for the use of officers. The forward part of the right side is reserved for the senior officer. The quarter-deck is saluted by all who step upon it, the officers present returning the salute. A sailor coming to the quarter-deck with a complaint always stood near the mast, at the forward end, and was said to "come to the mainmast." Because of its traditions the quarter-deck is a symbol of authority among seamen.

QUAR'TERMASTER, in the United States army a commissioned officer connected with the supply department. The quartermaster of a regiment usually has the rank of lieutenant. His duties are to superintend the assignment of quarters, fuel, clothing, food and other supplies, and to be guardian of his regiment's supplies when on the march. The quartermaster is appointed by the colonel, subject to the approval of the Secretary of War. He may be assisted by one or more quartermaster-sergeants.

The Quartermaster's Department. This is a staff department of the army. It has charge of the purchase and distribution of the supplies of the entire army. The quartermaster-general, who is at the head of the department, is a member of the general staff.

QUARTZ, the most abundant mineral and forms a portion of nearly all rocks. Pure quartz looks like the best quality of glass, for which it might be easily mistaken. A quartz crystal has the form of a six-sided prism,

with a pyramid at the end. The prisms are so hard that one can easily write on glass with them. When colorless this form of quartz is called rock crystal, and it is used to some extent in making ornaments and lenses for spectacles. When colored, quartz crystals take different names (see PRECIOUS STONES).

The most common forms of quartz occur in rocks. They vary in color from milky white to black. Red and brown quartz rocks are called jasper. Sandstone is formed of grains of quartz cemented together by some other mineral. Quartz forms a good proportion of granite, and it can be easily detected by its resemblance to broken glass. When quartz is ground to a powder and heated with potash, lime or soda, it melts and forms glass. The waters of many hot springs dissolve quartz, and when they cool, it forms in beautiful crystals around the edges of the springs. Some of the celebrated springs in Yellowstone Park are ornamented in this way.

QUART'ZITE, a metamorphic rock, named from the mineral quartz (see above), because that is its principal constituent. In its composition the quartz is alternated with sandstone. There are also frequent other ingredients, such as mica and feldspar. See METAMORPHIC ROCKS.

QUARTZ VEIN, a rock fissure filled with quartz, most frequently of igneous origin (formed by fire) but sometimes a hardened solution formed by precipitation.

QUASSIA, *kwosh'e a,* or **BITTER ASH**, a genus of South American tropical plants, which includes both trees and shrubs. The tree of one species grows to a height of twelve feet and bears long clusters of red blossoms. The wood, which is exceedingly bitter, is shunned by insects and is therefore much used in cabinet making. The root, which also is bitter, was formerly used as a cheap substitute for hops to give a bitter flavor to beer.

QUATERNARY, PERIOD, *kwah tur'na ry,* a term formerly applied to that division of the Cenozoic Era following the Tertiary Period and including the subdivisions called, respectively, Glacial and Recent.

QUATRAIN, *kwot'rane,* from a French word meaning *four,* is a rhymed poem of stanzas of four lines each. The most famous quatrain of the present day is the Fitzgerald translation of *Omar Khayyam.* Many epigrams, proverbs, epitaphs, etc., are also in this form.

Church at St. Anne de Beaupre

QUEBEC, *kwe bek',* the oldest and largest province of the Dominion of Canada, is bounded on the south by Ontario, New York, the Northern New England states, New Brunswick and Chaleur Bay; on the east by the Atlantic Ocean and Labrador, on the north by Hudson Strait and Ungava Bay, and on the west by Hudson Bay, James Bay and Ontario. Its greatest extent from east to west is about 1,000 miles, and from north to south the distance is about the same. The most easterly point is 500 miles farther east than Porto Rico, and its western boundary has practically the longitude of the western boundary of New York. The area is 706,843 square miles, of which 5,000 square miles are water. Quebec is two and a half times the size of Texas and about three times that of France.

The People. The province was originally settled by the French, and the descendants of these colonists constitute more than three-fourths of the population. They have maintained not only the language, but many of the institutions and customs, of their ancestors, so that the Province of Quebec is more completely foreign than any other portion of the Dominion. In their habits of dress, in the construction of their dwellings and in their social life, the French Canadians form a class by themselves. In general they are industrious, frugal and prosperous. Notwithstanding the fact that thousands of them have emigrated to the New England states, the province increased over twenty per cent in population between 1901 and 1911, the date of the last census, when the population was 2,003,232.

French is the language generally spoken, except in Montreal, where there are as many English-speaking as French-speaking people, and in a small area bordering on the New England states, known as the Eastern Townships. The inhabitants of this section are of English descent, and in customs and language resemble closely the people of New England.

About six-sevenths of the people are communicants of the Roman Catholic Church,

and the country contains a number of noted cathedrals, churches and shrines. Not the least famous among them is the old church of Ste Anne de Beaupré, where, so it is said, thousands have been healed of various diseases. The other denominations, in order of their membership and importance, are the Anglican (Episcopal) Presbyterian, Methodist and Lutheran.

Surface and Drainage. The land along the Saint Lawrence River and between the Saint Lawrence and Richelieu is low and level, but with this exception that portion of the province south of the Saint Lawrence is traversed by the Notre Dame Mountains, which are an extension of the Green Mountains and follow the course of the river in a northeasterly direction to Gaspé Peninsula. These mountains are really a low plateau, but here and there are a few prominent peaks, among which Black Mountain, Belœil, near the Richelieu River, and Sutton Mountain, farther east, are the most prominent. Mount Royal, near Montreal, is also noticeable, but it is considered to be of another formation. North of the Saint Lawrence is the Laurentian Plateau, consisting very largely of a rocky, undulating surface, with but little good soil, though a large portion of the region is quite heavily timbered. This plateau is traversed by the Height of Land, which separates the rivers flowing into the Atlantic from those flowing into the Arctic Ocean. In the western part of the province this reaches an altitude of 1,000 feet, but it gradually rises toward the east, until, along the northern banks of the Saint Lawrence, bluffs ranging from 1,500 to 1,900 feet are found.

The Saint Lawrence and its tributaries drain nearly all of the province, and to the influence of this magnificent river Quebec owes very much of its development and prosperity. The chief tributaries of the Saint Lawrence from the north are the Ottawa, forming a part of the southern boundary; the Gatineau, noted for lumber along its course; the Saint Maurice, remarkable for its volume of water and its falls; the Montmorency, with celebrated cascades, and the Saguenay, famous for the grandeur of its scenery. The important tributaries from the South are the Richelieu, which drains Lake Champlain; the Chaudière, noted for beautiful falls, and the Saint Francis, valuable for water power.

The region north of the Height of Land is drained into Hudson Bay and the Atlantic Ocean. Grand Falls, on the Hamilton River, is a cataract that in many respects rivals Niagara. The main fall is 200 feet wide and 310 feet high. Were this water fall easily accessible it would be visited by thousands of tourists every year.

There are numerous lakes, most of them north of the Saint Lawrence. Lake Megantic, north of Maine, is a favorite resort of fishermen; Memphremagog, with its southern end in Vermont, is widely known for its beautiful scenery, and Lake Saint John, 200 miles north of Quebec, is a popular resort.

Climate. Quebec has a cool temperate climate. The winters are long and severe, extending from November to April, and during the coldest weather the thermometer is liable to reach 20° below zero. The summers are warm, but not excessively hot. In general, the air is dry and bracing, and the climate is remarkably healthful. The rainfall is ample for agricultural purposes, and a large portion of the province is covered by deep snow during the winter.

Minerals and Mines. Quebec's mineral resources are only partially developed. The province supplies about eighty per cent of the world's output of asbestos. The mines are located in the Eastern Townships, chiefly in Thetford and Danville. The yearly output is valued at about $4,000,000. The output of cement amounts to about $3,362,000, and that of marble and limestone to over $1,800,000. Bricks are made in a number of localities, and copper is mined in the Eastern Townships. Graphite, manganese and other minerals are mined in paying quantities, but owing to the absence of coal, iron is not mined.

Fisheries. A large number of the people living on the shores of the Gulf of Saint Lawrence are engaged in fishing, and the total value of the fisheries is over $3,000,000 yearly. Cod, herring and salmon, in the order named, yield the largest revenue. Lobsters, mackerel and other fish are also taken in large numbers. The industry gives employment to about 10,000 men.

Agriculture. Agriculture is the leading industry, and more than one-half the occupied land is under tillage. However, this is but a small part of the tillable land in the province. The most fertile lands are in the river valleys and in that part of the

province south of the Saint Lawrence, where the land is all occupied. North of the Saint Lawrence there are large areas of fertile land, but they are separated by rocky tracts. The leading crops are hay, oats, wheat, potatoes,

COAT OF ARMS OF QUEBEC

Two fleur de lis, in blue, on a gold background, symbolize the days of French rule in Quebec. The British lion, on a red field, is the symbol of unity with the Empire. Below is a sprig of green maple leaves on a gold background, the maple leaf being used as the national emblem of Canada.

peas, buckwheat, vegetables and tobacco; the latter is grown in the counties immediately around Montreal and on the north shore of the Saint Lawrence. Apples and plums of excellent quality are raised in the Eastern Townships, and small fruits are successfully grown. This section is also well suited to dairy husbandry, and large quantities of butter, cheese and condensed milk are made. The annual dairy output of the province amounts to over $35,000,000. The raising of live stock is an extensive branch of industry, and good breeds of horses, cattle, swine and sheep are an important source of revenue to the farmers. Bees are kept in the more favorable localities, and the provincial Department of Agriculture is extending the poultry industry by sending to the children in the rural schools settings of eggs each year that they may receive training in the care of poultry.

Forests and Lumber. Over 130,000,000 acres of forests have been surveyed, and in addition to this vast area are the unexplored forests of Ungava. These great forest areas are all north of the Saint Lawrence, and it is in this region that the great lumber interests are located; 5,000,000 acres of the surveyed forests are under private ownership, and 45,000,000 are licensed to lumbermen, the balance remaining under control of the government. Spruce, pine, hemlock, balsam and tamarack among the soft woods, and oak, beech, birch and maple among the hard woods, are used extensively.

Lumbering is one of the leading industries of the province, and is carried on chiefly around the sources of the Ottawa, the Gatineau, the Saint Maurice and a few other streams north of the Saint Lawrence. Most of the timber is worked up in mills on the rivers, but some of it is made into rafts that are towed long distances by steamers. Lumber of all dimensions, including shingles and lath, is made in large quantities. Large quantities of spruce are made into pulp for paper. The annual output of the lumber industry is worth about $14,000,000.

Quebec has about 174,000 square miles of forest reserves. The Labrador Reserve, 110,000 square miles, is the largest.

Manufactures. Quebec is the second province in the Dominion in the extent and value of its manufactures. Nearly every stream is a source of water power, and sawmills, gristmills and small factories are generally distributed over the older parts of the province. The manufacture of lumber and lumber products is the leading manufacturing industry; on the larger streams are numerous plants for the development of electric power. In Montreal, Quebec and Saint Hyacinthe are large boot and shoe factories. The leading ironworks are at Montreal, Three Rivers and Sherbrooke. These cities and Valleyfield also are the sites of the largest cotton and woolen mills. The annual value of the manufactures is about $351,000,000.

Transportation and Commerce. The Saint Lawrence is navigable for large ocean steamers as far as Montreal and furnishes ample water transportation for the interior, as well as for the towns along its banks. The Grand Trunk and other railways thread that section south of the Saint Lawrence, so that all counties and nearly all townships in this region have ready access to the railway, while the Canadian Pacific and the Intercolonial systems have lines extending from Quebec to Montreal and westward on the north side of the Saint Lawrence.

Items of Interest on Quebec

The area of Quebec for many years (from 1898 to 1911) was 351,873 square miles, but by the addition of Ungava in 1912 it was increased to 706,834 square miles.

There are three main physical divisions: (1) the Laurentian highlands, really a plateau; (2) the valley of the St. Lawrence; (3) the Notre Dame Mountains and the rolling country to the southeast of this range.

The highest point in southern Quebec is Mount Logan, in Matane county, 3,708 feet; the highest point in the Ungava district is Nachvak Mountain, about 6,000 feet.

Some of the rivers draining the plateau run in deep, high-walled valleys cut in solid rock, such as those of the Hamilton, Mingan and Saguenay rivers. The walls between which the Saguenay flows in some places reach a height of 1,500 to 1,800 feet.

In 1917 there were in the province 652,600 milch cows, 625 creameries, 880 cheese factories and 463 combined factories (making butter and cheese). The output of butter was 33,473,086 pounds, valued at $12,079,416; the total output of cheese was 59,651,615 pounds valued at $10,819,985.

The hay and clover crops have an annual value of about $58,500,000.

The annual output of maple sugar is about 12,000,000 pounds, which is about two-thirds the output of the Dominion.

The available water power of Quebec is over 4,668,000 horsepower.

The island of Anticosti, in the Gulf of St. Lawrence, now used as a game preserve, is 135 miles long by 40 miles wide.

Flax is cultivated in small quantities chiefly for its fiber; it is manufactured into fabrics almost exclusively by hand.

The growing of tobacco for commercial purposes is confined to the district around Montreal; the total production of Canada, which is divided evenly between Ontario and Quebec, varies from 9,000,000 to 12,000,000 pounds.

Quebec ranks second in the total value of manufactured commodities, with over $351,000,000 a year.

It leads the Dominion in the production of paper, and in the manufacture of tobacco products.

Quebec leads the world in the production of asbestos, the annual product being valued at nearly $4,000,000. Thetford, in Megantic county, is the center of this industry.

The mineral products of the province are worth over $16,000,000.

Eighty per cent of the inhabitants over five years of age can read and write.

Questions on Quebec

What is the present area of Quebec? When was the boundary changed?

What is the length of the province from east to west?

What are the three main physical divisions?

Name some of the principal rivers.

What and where is Anticosti?

What is the principal crop?

Name four other large crops.

What fruits are raised in Quebec? For what fruit is the Montreal district famous?

What is the relative importance of the dairy industry?

What are the principal products of the fisheries?

What is the approximate forest area?

Name four leading manufactures?

What are the principal mineral products?

What are the leading educational institutions?

Name five of the large cities.

Which is further east, Porto Rico or Quebec?

How much larger is Quebec than was the German Empire under the rule of William II?

What is Quebec's greatest waterfall? Why is it not more widely known?

If the mines at Thetford and Danville should stop operating what industries would be affected?

Numerous short lines are found in those regions where industries warrant their construction, and a branch has been extended northward to Lake Saint John.

The commerce of the province is considerable, the exports consisting of lumber, stock and dairy products and some manufactures, while the imports consist of manufactured goods. Most of the foreign trade is with Great Britain and the United States. Montreal and Quebec are the chief commercial centers, and Montreal, the meeting place of inland and ocean traffic, has become the great commercial center of the Dominion. From this port large quantities of wheat grown in the northwestern provinces are shipped to Europe.

Government. The chief executive is a lieutenant-governor, appointed by the Governor-General of the Dominion, with the advice of his Council. The lieutenant-governor is assisted by a council of six members, appointed for life. The legislature consists of a council of twenty-four members, appointed for life, and an assembly of seventy-five members, chosen by public vote. The administration of justice in Quebec differs quite materially from that in other Canadian provinces, since the French law and French system of courts are in vogue, this privilege having been granted the early inhabitants when Quebec became British territory.

Education. The public schools are under the administration of a superintendent of instruction, but a dual system is maintained, both the Catholics and Protestants having charge of schools of their respective faiths and having a right to prescribe certain religious instruction. Two provincial school committees are maintained, one being Catholic and the other Protestant. The local management of the schools rests with township or district officers. The province maintains a normal school, and there are a number of colleges and secondary schools under religious denominations. The most noted among the higher schools are Laval University at Quebec, a Catholic institution, and McGill University at Montreal, non-denominational, by far the most widely known of the educational institutions in the Dominion.

Cities. The chief cities are Quebec, the capital; Montreal, Saint Hyacinthe, Hull and Sherbrooke.

History. Cartier was the first white man to visit the province. In 1608 Champlain made the first settlement by founding a colony at Quebec. Seven years later the Recollet and Jesuit missionaries began their work among the Indians and explored a large part of the province. However, for a long time but few permanent settlements were made, those coming to the country from France being devoted to trading with the Indians and to exploring the wilds of the forests. Indian wars undoubtedly had much to do with preventing settlements during this period. After several changes, the Province of Quebec finally became a British province in 1763. Soon after, the region was divided into two provinces, Quebec being known as Lower Canada, or Canada East, and Ontario as Upper Canada, or Canada West. The provinces, however, were reunited in 1841 and remained under one colonial government until the formation of the Dominion, in 1867, when Ontario again became independent, both provinces joining the federation.

Related Articles. Consult the following titles for additional information:

CITIES AND TOWNS

Chicoutimi
Hull
Lachine
Levis
Montreal
Quebec
Saint Anne de Beaupré
Saint Hyacinthe
Saint Johns
Sherbrooke
Sorel
Thetford Mines
Three Rivers
Valleyfield

RIVERS

Chaudière
Memphremagog
Ottawa
Saguenay
Saint Lawrence

UNCLASSIFIED

Anticosti
Champlain, Samuel
Laurentian Mountains
Quebec Act
Quebec Resolutions
Quebec Tercentenary

QUEBEC, BATTLE OF, one of the most important military engagements in American history, waged on the Plains of Abraham, behind the city of Quebec, on September 13, 1759. To bring about the final overthrow of the French in America and end the French and Indian War, Great Britain directed an offensive against the principal French strongholds, Montreal and Quebec. In June, 1759, General Wolfe, with an army of 9,000 men, sailed up the Saint Lawrence and landed on the southern bank of the river. Quebec, on the opposite side, occupying an almost impregnable position on a high bluff, was defended for several miles by French guns.

Realizing that the city could be taken only by direct assault, Wolfe planned one of the most daring projects ever conceived by a military leader—to scale the heights under

QUEBEC

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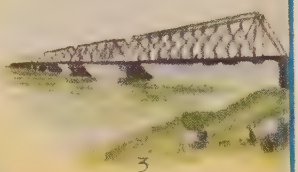

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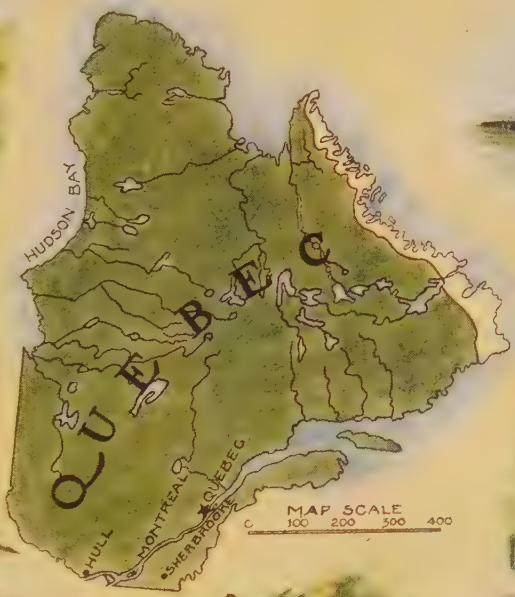

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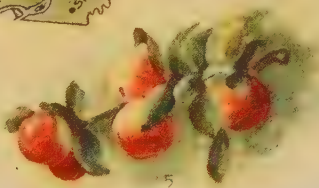

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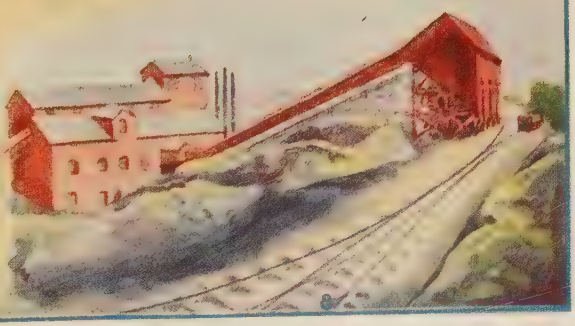


1, Citadel of Quebec.
2, Montmorency Falls.
3, Victoria Bridge, Montreal.
4, Tobacco Plant.
5, Apples.
6, Cathedral of Notre Dame, Montreal
7, Lumbering.
8, Asbestos Mill.

cover of darkness and attack Montcalm, the French commander, from the rear. After the most careful preparations, on a night when there was no moon, the British rowed silently to a point above the fort, where a narrow pass, the bed of a dried up stream, led to the plain above. Throughout the night, in single file the British soldiers made their way up, and when day dawned the whole army, numbering between 4,000 and 5,000 men, was drawn up for battle. After a brief engagement Quebec fell. Both commanders were killed.

With the fall of Quebec, French power in America came to an end, and by the Treaty of Paris, in 1763, the whole of Canada was ceded to Great Britain. The site of the battle is now a part of the Battlefields National Park. See PARKS, NATIONAL.

QUEBEC, CITY OF. It is related in the early history of New France that when Jacques Cartier (which see) sailed up the Saint Lawrence River in 1535, as he passed a large island he beheld a bold promontory projecting from the north bank of the river. Surprised at the sudden appearance of the bluff, which rises to the height of 333 feet, the explorer exclaimed "Quel bec!" (meaning "*What a beak*"), and from this incident it is said the bluff and the city built around and upon it took the name Quebec.

Sometimes called the "Gibraltar of America," and sometimes the "Cradle of New France," Quebec, the capital of the province of Quebec, is the oldest city of Canada. It is built around and upon the promontory known as Cape Diamond, formed by the confluence of the Saint Charles River with the Saint Lawrence. It is 164 miles northeast of Montreal, 780 miles southwest of the Strait of Belle Isle, and 430 miles northeast of New York. When Cartier discovered the promontory, the Indian town of Stadacona was clustered about the foot of the bluff. Cartier took possession of the place in the name of the king of France, but no attempt at settlement was made until 1608, when Samuel Champlain (which see) began a settlement that was destined to become the center of French activities in America.

General Description. The city is divided into the upper and the lower towns. The lower town is built along the river banks, at the foot of the bluff, and contains the wholesale district, the wharves, the railway depots and the principal business establishments. The upper town is built upon a terrace and on the top of the bluff and is from 100 to 300 feet higher than the lower town. The two parts of the city are connected by steep, narrow streets and by flights of steps, some of which have been cut in the rock. The upper town is devoted to residences, hotels, churches, convents and retail establishments. A portion of this part of the city is enclosed by a high wall, which extends around the point of the bluff and was formerly entered through a number of gates, though all but two of these have been removed. In general, the streets are narrow and irregular, except in the more level parts of the upper town, where the city is regularly laid out. The

QUEBEC AND VICINITY

highest point of the bluff, known as Cape Diamond, is occupied by the citadel, which encloses an area of about 40 acres and is usually occupied by a garrison of Canadian militia. The remarkable strength of this fortress during the French and Indian Wars gave Quebec the name *Gibraltar of America,* but the fortifications would afford little resistance to a modern warship. To the south of the citadel are the Plains of Abraham, on which was fought the battle that resulted in transferring all the French dominions in America to the British (see QUEBEC, BATTLE OF). The battlefield is now a national park. At the foot of the citadel and extending a little to the north, occupying a terrace about a quarter of a mile long, is Dufferin Terrace, a celebrated promenade 200 feet above the river, from which one of the finest views of the city and the surrounding country can be obtained. Back of this terrace is the governor's garden, in which there is a monument to Wolfe and Montcalm.

Quebec more closely resembles an old European town than any other American city. Many of the older buildings are constructed of cobblestones, held together by mortar, and nearly all are of a gray limestone found in the vicinity. With few exceptions the roofs are covered with tin, and the style of architecture is that of the French cities of the days of Louis XVI. These features, combined with its narrow, winding streets, give the city a quaint and interesting appearance.

Public Buildings. Among the most important public buildings are the houses of parliament and departmental buildings of the provincial government, the postoffice, the customhouse, the city hall, the armory and the exhibition building, the courthouse and a number of business blocks and banks. Among the churches, the Basilica, formerly the Catholic cathedral, situated on one side of Market Square in the upper town, is of first interest. It seats an audience of about 4,000 and contains a number of paintings by Van Dyck, Carracci, Hallé and other distinguished painters. Nearby are the buildings of Laval University, the chief Catholic college of Canada, noted for its museum of Indian antiquities (see LAVAL UNIVERSITY). The English Cathedral, the First Methodist Church and St. Andrew's Presbyterian Church are also worthy of mention. Quebec contains a number of large convents. Among these, the Ursuline Convent is celebrated for its large building and beautiful grounds. It is also of historic interest, because within the building are the remains of Montcalm. Hotel Dieu is also worthy of mention, because of the large hospital connected with it. At the lower end of Dufferin Terrace is Chateau Frontenac, Quebec's leading hotel.

Other Points of Interest. Nine miles south of the city are the Falls of Montmorency, formed by the Montmorency River, where it plunges over the bluff to reach the Saint Lawrence. This little cascade is 275 feet high and is famous for its beauty. Across the river, near Levis, are the Chaudière Falls, 350 feet wide and 150 feet high. Another object of interest is the great cantilever bridge, the largest of its kind in the world, connecting Quebec with Levis, on the opposite bank of the Saint Lawrence. This bridge was completed in December, 1917 (see BRIDGE). The shipping of lumber and the manufacture of textiles, boots and shoes are the leading industries.

History. The discovery of the site of the city is told in the opening paragraph. The first settlement was made by Champlain in 1608. The city was captured by the English in 1629 and was restored to the French three years later. In 1690 the New England colonists made an expedition against it, but failed. Another similar expedition which also resulted in failure occurred in 1711. During the French and Indian Wars it was an important military post and the center of French activities. It fell into the hands of the English in 1759, and the result of the capture was confirmed by the Treaty of Paris four years later. Quebec was the capital of Canada until 1858, when the capital was transferred to Ottawa. The city has grown slowly, yet it is an important shipping point. The largest ocean-ships visit the city, where they exchange cargoes with river boats. The Canadian Pacific, the Grand Trunk, the Intercolonial and a number of shorter lines of railway connect Quebec with the important cities of the Dominion and with the United States. Population, 1911, 78,190.

QUEBEC ACT, an act passed by the British Parliament in 1774 to provide for a government for the province of Canada, which had been acquired from France eleven years previously (see QUEBEC). By this act the boundaries of Quebec province were extended to include all the North West Territory; French civil law was substituted for English and an appointive legislative council was established, by means of which representative government was withheld from the people. The extension of Quebec provoked the indignation of the thirteen English colonies, for it meant encroachment upon land included in their original charter. It was one of the causes that led to revolt in 1775.

QUEBEC BRIDGE. See QUEBEC, CITY OF; BRIDGE, page 556.

QUEBEC RESOLUTIONS, the document which made Confederation in Canada possible. It was drawn up in October, 1864, by representatives from the various provinces who met in Quebec under the leadership of Sir John A. Macdonald. These representatives drew up the set of resolutions embracing the conditions upon which federal union might be possible. They were adopted by the legislatures, and in the form of a series of addresses were presented to Queen Victoria. They formed the nucleus for the British North America Act, which estab-

lished the Dominion of Canada. See BRITISH NORTH AMERICA ACT.

QUEBEC TERCENTENARY, *ter cen'te-na ri.* The city of Quebec was founded by Samuel de Champlain in 1608. A celebration in honor of the three-hundredth anniversary of the event took place there in 1908, beginning July 23 and continuing two weeks. Pageants were enacted illustrating many important events in Canadian history. British warships and naval craft from the United States, France, Germany, Spain, Italy, Japan and Argentina participated. The Prince of Wales, now King George V, was present. The United States was officially represented by Vice-President Fairbanks.

QUEEN, a female sovereign, *queen regnant* if she is supreme ruler; *queen consort* if she is queen only by virtue of the fact that she is the wife of a reigning king. The mother of a king is known as the *queen mother,* and the widow of a king as *queen dowager.* A queen who holds the throne in her own right has the same duties and obligations and the same political status as king; a queen consort, while the first woman of the realm, is legally the king's subject.

QUEEN ANNE'S WAR. See FRENCH AND INDIAN WARS.

QUEEN CHARLOTTE, *shahr'lot,* **ISLANDS,** a group of islands of volcanic origin off the coast of British Columbia, and forming, politically, a part of that province. The islands, of which the largest are Graham and Moresby, have a total area of 5,100 square miles. They are inhabited chiefly by Indians of the Haida tribe, a highly-enlightened people, who here number 700. All the islands are covered with magnificent forests; gold-bearing quartz of rich quality has been found, and copper and iron ores and a fine vein of anthracite coal are among the resources. There are good harbors, and fishing is an important industry.

QUEENSBERRY, JOHN SHOLTO DOUGLAS, Eighth Marquis of (1844-1900), a famous English patron of sports. He succeeded to his father's titles and estates in 1858, served five years in the army, and from 1872 to 1880 represented Scotland in the House of Lords. He was one of the founders of the Amateur Athletic Club and helped to formulate the rules for prize fighting known as Queensberry rules. See BOXING.

QUEENSLAND, a state of the Commonwealth of Australia, comprising the entire northeastern part of the continent. Its extreme length from north to south is 1,200 miles, its greatest breadth is 940 miles, and its area is 670,500 square miles, or about one-fifth that of the United States. The coast line is 2,250 miles in extent. The coast is skirted by numerous islands, and beyond these lies the Great Barrier Reef, a coral ridge over 1,200 miles in extent and enclosing a long, narrow body of quiet water, having many fine harbors.

The wedge-shaped northern extremity known as York peninsula partially encloses the Gulf of Carpentaria. Toward the west a large portion of the surface is dry and barren, but toward the east, and for a long stretch along the coast, boundless plains, or downs, admirably adapted for sheep walks, and ranges of hills, generally well wooded and intersected by fertile valleys, form the prevailing features of the country. The highest mountains are near the coast, the greatest elevation being about 5,400 feet. Queensland has a large number of rivers, several of which are navigable for long distances and are convenient outlets for the produce of adjacent districts.

The climate is healthful, and the temperature is comparatively equable. The mean temperature at Brisbane is 69°, and in the hottest parts of the state the temperature seldom rises above 97°. The rainfall in the interior is scanty and variable; the mean fall at Brisbane is about 50 inches, and in the northern coast districts it sometimes reaches 150 inches. Here it is of little value for agricultural purposes.

The People. About one-fifth of the inhabitants are of British descent, and about one-fourth are full-blood or half-blood Asiatics, including Polynesians. Most of the remainder consist of native Australians, many of whom are living in a civilized state. There is also a sprinkling of Germans, Danes and Scandinavians. In 1911 the population was 605,813; in 1917 it was estimated at 681,300, exclusive of the natives. Brisbane (which see), the capital and largest city, has about 170,000 inhabitants. The other cities having 20,000 or more inhabitants are Ipswich, 25,000; Toowoomba, 24,200; and Rockingham, 20,900.

There is no state Church. The leading religious denominations are Anglican (Episcopal), Roman Catholic, Presbyterian, Methodist, Lutheran and Baptist.

Primary education is free and compulsory, and the percentage of illiteracy is very low. Separate schools are maintained for boys and girls. In addition to the grammar and high schools there are seventeen technical schools. The University of Queensland, established at Brisbane in 1911, is rapidly increasing in numbers and influence.

Industries. Agriculture and the raising of live stock are the principal occupations. In the eastern section the land is suitable for cultivation, and large crops of sugar cane, hay, wheat, corn and potatoes are grown. Among the fruits bananas, oranges and pineapples are plentiful. The more arid lands in the west are devoted to grazing and large numbers of sheep and cattle are raised. In some sections dairying is important.

There are rich stores of gold, silver, copper, tin and bismuth in the mountains. The state also contains extensive coal measures, and will in the near future, become an important producer of coal. The principal manufactories are sugar mills, steam sawmills, soap works, agricultural implement works and distilleries. There are about 5,000 miles of railway in operation, as well as efficient telegraph and telephone systems. The chief exports are sugar, gold, wool, meat and hides.

Government. The executive department of the government is vested in a governor appointed by the Crown. He is assisted by a council, or cabinet, of nine members. The legislative council consists of forty-nine members, nominated by the Crown for life, and an assembly of seventy-two members, elected by the people for three years, and representing electoral districts.

History. The first settlement of Queensland took place in 1826, when the territory was used as a place of transportation for convicts, who continued to be sent there till 1839. In 1842 the country was opened to free settlers. It was originally a part of New South Wales and was organized as a separate colony in 1859. In 1899 the colony accepted the constitution of the Australian Commonwealth.

QUEENS'TON HEIGHTS, Battle of, a battle of the War of 1812, between 1,500 British troops under General Brock and 6,000 Americans under Generals Van Rensselaer and Smyth. On October 13, the Americans began to cross the Niagara River to Queenston Heights, an enemy position seven miles below the falls. They were attacked, but succeeded in taking the heights. Later in a surprise attack they were forced to withdraw, leaving 900 of their men prisoners. General Brock was mortally wounded. A beautiful monument in memory of him was erected on the battlefield by the province of Ontario.

QUEENS'TOWN, Ireland, formerly Cove of Cork, is an important naval station, ten miles east southeast of Cork, on the south side of Great Island, which rises abruptly out of Cork harbor to a considerable elevation. The streets rise above one another in the form of an amphitheater and present a very picturesque appearance. It has little trade and no manufactures, being almost solely dependent on the military and naval establishments in its vicinity and on the numerous visitors attracted by the singular beauty of the place and by its delightful climate. Population, 1911, 7,864.

QUETZAL, *kwet'sawl,* a beautiful tropical bird of the trogon family, native to Central America, India and Africa. It is about the size of the magpie. The back, head, crest and fluffy throat and chest are bright emerald; the lower parts are brilliant scarlet. The feet are small, and are useless for walking. The male is more brilliantly colored than the female and has handsome upper tail coverts about three and a half feet long. These birds live in the heart of the forest and feed on wild fruits, lizards, worms and insects. The eggs are laid in decaying stumps.

QUETZAL

QUETZALCOATL, *kets al ko aht'l,* the god of the air of the ancient Mexicans, who presided over commerce and the useful arts and is said to have predicted the coming of the Spaniards to Mexico.

QUICK'SAND, a deep mass of water-soaked sand, so loose and soft that it cannot be walked upon. Quicksands are formed on many sea coasts, and sometimes at the mouths of rivers. They look like damp, hard sand, and their fluid quality is not suspected by

persons unfamiliar with their treacherous character. Many an unwary traveler in a strange region has been engulfed in quicksand in trying to make his way across it, and has gradually sunk into it to his death. Where it is necessary to conduct engineering operations in quicksand areas, pipes filled with brine are sunk into the sand and the surrounding mass is hardened by freezing; sometimes, too, caissons are used to overcome the difficulty. See CAISSON.

QUICK'SILVER. See MERCURY.

QUILLER-COUCH, *kooch*, ARTHUR THOMAS, Sir (1863-), an English author, born in Cornwall, and educated at Clifton College, and at Trinity College, Oxford, where he later became a lecturer in the classics. In 1887 he went to London, where for many years he was an editor of *The Speaker*. In 1891 he settled in his native Cornwall, a country which figures so charmingly in his novels and romances. *Troy Town*, *The Splendid Spur*, *The Delectable Duchy* and *From a Cornish Window* are perhaps the best known of his thirty-five volumes. Besides novels, he has written numerous essays and some very creditable verse.

QUINCE, *kwints*, a small tree of the rose family, with leaf, flower and fruit closely resembling the apple and pear. It is a native of the island of Crete, but is cultivated throughout Europe and in America. The fruit is unfit to eat unless cooked. The tree is hardy and is cultivated throughout the South and as far north as New York state, where there are extensive orchards.

QUINCY, *kwin'zi*, ILL., the county seat of Adams County, 265 miles southwest of Chicago, on the Mississippi River and on the Chicago, Burlington & Quincy, the Wabash, the Hannibal & Saint Joseph, the Quincy, Alton & Saint Louis, the Quincy & Warsaw, the Saint Louis, Keokuk & Northwestern and the Omaha & Kansas City railroads. There is also steamboat service on the great river. The industrial establishments include stove foundries, machine shops, show-case works, and manufactories of air compressors, shoes, optical goods, brick, flour, wagons, agricultural implements, engines and various other articles. The city has an elevated location on a bluff 120 feet above the river. It contains the Saint Francis Solanus College, a Roman Catholic school for priests; Chaddock Boys' School, and Saint Mary's Institute. Other institutions are the state soldiers' and sailors' home, Saint Mary's and Blessing hospitals, several homes for orphans and the aged, the Quincy Historical Society, and Cheerful Home Settlement. A Federal building, a courthouse, a Masonic Temple, an armory, a library and a city hall are prominent structures. There are eleven parks, covering more than 150 acres. Quincy was settled in 1822 and was chartered as a city in 1839. Population, 1910, 36,587; in 1917, 36,832 (Federal estimate).

QUINCY, JOSIAH (1772-1864), an American lawyer and orator, born in Boston, of prominent Revolutionary ancestry. He was educated at Harvard and admitted to the bar, after which he took an active interest in politics. As an extreme Federalist he became a member of the Massachusetts legislature in 1804, and the following year was elected to Congress. He vigorously opposed the administrations of Jefferson and Madison and particularly denounced the purchase of Louisiana, declaring it a just excuse for a division of the Union, and later opposed the War of 1812. In that year he retired from Congress, devoted himself thereafter chiefly to agriculture. However, he was subsequently elected to the Massachusetts house of representatives and later became mayor of Boston. In 1829 he became president of Harvard College, where he served with distinction until 1845. He wrote *History of Harvard University* and *Life of John Quincy Adams*.

QUINCY, MASS., a city in Norfolk County, on Quincy Bay, adjoining Boston on the south, on the Town River and on the New York, New Haven & Hartford railroad, built in 1833 as the Old Colony Railroad. It is primarily a residence place, but has a large shipbuilding plant, machine shops, iron foundries, brass works and gear works. The city has nearly 2,500 acres of public parks. It contains the Woodward Institute for girls, Quincy Mansion School, the Crane Public Library and a city hospital. The place was settled in 1625 as Mount Wollaston. It remained a part of Braintree until its incorporation in 1792, when it was named in honor of John Quincy. It was the birthplace of John Adams, John Quincy Adams and John Hancock. Population, 1910, 32,642; in 1917, 39,022 (Federal estimate).

QUININE, *kwi'nine*, or *kwi-neen'*, a white crystalline substance, inodorous, very bitter and possessing the power to allay fevers. It is the only remedy known for curing malaria

(which see). The drug is obtained from the bark of several trees of the cinchona family. In small doses it is a tonic; in large doses it causes extreme disturbance of the nerves, headache, deafness, blindness and paralysis, and in rare cases, death. In all cases quinine should be taken only on the advice of a reliable physician.

QUINSY, *quin'zi*, an inflammation of the membranes of the tonsils, often followed by the formation of ulcers which are difficult to heal. The disease usually begins with a chill, which is followed by fever and by severe pain and swelling of the tonsils. Sometimes the pain is intense and the swelling is so great that the jaws can scarcely be moved, and a general fever and even delirium may result, but the disease is rarely fatal. It does not seem to affect either children or old people. A light attack can usually be cured by rest in bed, the administration of a laxative, gargling and a dose of quinine. Severe cases need the attention of a physician.

QUINTIL'IAN, or MARCUS FABIUS QUINTILIANUS, (about A. D. 35-about 97), a Roman rhetorician, born in Spain. He probably went to Rome in his youth and, except for occasional sojourns in Spain, spent the rest of his life there. He practiced as an advocate and was very successful, but his chief claim to celebrity lay in his extraordinary ability as a teacher of eloquence. He taught twenty years, occupying a liberally-endowed chair of rhetoric created for him by Vespasian. He believed that training for oratory should begin in infancy and include a broad education. His ideas on education were incorporated in his *Institutio Oratorio*, a work remarkably sound in its judgments and broad in its treatment of rhetoric. It is not known whether any of his work survives. The 164 extant discourses attributed to him are probably the work of another.

QUIRINAL, *kwir'inal*, one of the hills on which Rome is built. It was named for the war god Quirinus, and in ancient times was the site of a temple in honor of him. In 1574 Pope Gregory XIII began on the hill the construction of a palace, which was finished by his successors and used as a summer Papal residence. Since the unification of Italy, in 1870, the palace has been a residence of the king of Italy. The arrangement and decorations are thoroughly modern, and the interior is adorned with famous works of art.

QUITCLAIM. See DEED.

QUITO, *ke'toh*, ECUADOR, the capital of the country, situated a little to the south of the equator, in a ravine on the east side of the volcano of Pichincha, 9,348 feet above the sea. Its streets, with the exception of four, which meet in the large central square, are narrow, uneven, badly paved and steep. Most of the buildings are low, adobe structures. Among the more important public buildings are the cathedral, several other churches and convents, the townhouse, the courthouse, the president's palace, the university, the episcopal palace, an orphan asylum and a hospital. The manufactures consist chiefly of woolen and cotton goods, saddles, shoes and carpets. The city is provided with electric lights and a good telephone system. It is connected with its seaport Guayaquil, 165 miles distant, by a railroad, and it has telegraph and wireless communication with the other cities of the country and the world. The lack of good roads and railways has prevented the growth of any considerable trade. Quito was originally the capital of a native kingdom of the same name, but the modern town was founded by the Spaniards in 1534. It has repeatedly suffered from earthquakes. Population, about 70,000, largely half breeds and Indians.

QUOITS, *kwoits*, a game played with flattened rings of iron, generally from 8¼ to 9½ inches in external diameter, the rim being 1 or 2 inches in breadth. The quoits are convex on the upper side and slightly concave on the under side, so that the outer edge curves downward and is sharp enough to cut into soft ground. Two pins, called *hobs*, are driven into the ground from 12 to 24 yards apart, and the players, who are divided into two sides, stand beside one hob. In regular succession they throw their quoits (of which each player has two) as near the other hob as they can. In throwing the quoit an upward and forward pitch is given it with the hand and arm; this imparts to it a whirling motion, which makes it cut into the ground. The quoit, or pair of quoits nearest the hob count each a point toward the game; if a quoit leans against the hob it is a "leaner" and counts 3; if it encircles the hob it is a "ringer," and counts 5 points. The winning score is 21 points. While regulation quoits are recommended for use, the game is most frequently played with common horseshoes.

QUO'RUM, a parliamentary or legal term, denoting the number of members of an as-

sembly required to be present for the transaction of its business. This number varies, and usually is fixed by the constitution, by-laws or charter of the organization, or it may be determined by the assembly itself. A quorum is usually a majority of the regular members.

In the British Parliament, where the matter is determined by each house for itself, a quorum in the House of Commons is forty members, and in the House of Lords, three. The United States Constitution fixes the quorum of each of the houses of Congress as a majority of all the members elected to each house. It was the former practice in the House of Representatives, in determining a quorum, not to count the members who were present who did not vote on a question, but during the speakership of Thomas B. Reed, all members present were counted, and this is now the regular rule, although not a written one. See PARLIAMENTARY LAW.

QUOTATION, *kwo ta'shun*, **MARKS**, symbols of punctuation used before and after certain expressions. Double marks are used except when a quotation occurs within a quotation; in that case the inner expression is enclosed by single marks. The first set of marks are inverted commas; the second are apostrophes.

The following rules pertaining to their use are generally accepted:

A direct quotation is set off by quotation marks, as: General Pershing exclaimed, "Lafayette, we are here."

When several paragraphs are quoted and quotation marks are used, it is customary to place the symbols at the beginning of each paragraph and at the end of the last one.

A word or phrase accompanied by its definition is set off by quotation marks, as: In military phraseology, "to strike the flag" means to haul it down.

Technical, unusual, slang or coined expressions are set off by quotation marks. This is also true of nicknames, popular names of states and cities, pen names and the like. In all of these cases, however, some authorities prefer italics.

Either italic or quotation marks are used to set off names of ships, names of pictures and titles of poems, books, lectures, sermons and periodicals.

Some authorities place the final pair of quotation marks after the semicolon when that symbol closes the quoted passage. Others place the marks before the semicolon.

Quotation marks are used after a question mark, when the quoted passage is a question, as: He said, "Are you reading this book?"

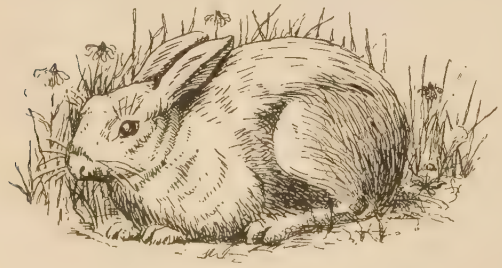
QUO WARRANTO. See WRIT.

R

R, the eighteenth letter of the English alphabet. In Phoenician and in early Greek it resembled a *P,* and the extra line was added in Latin, after the *P* assumed its present form. In the pronunciation of English words it represents two somewhat different sounds. The one is heard at the beginning of words and syllables and when it is preceded by a consonant; the other, less decidedly consonantal, is heard at the end of words and syllables and when it is followed by a consonant. In the pronunciation of many English speakers, *r,* followed by a consonant at the end of a syllable, is scarcely heard as a separate sound, having merely the effect of lengthening the preceding vowel.

RAB'BI, among the Hebrews, a title of honor, which came into use in the period immediately preceding the birth of Christ. In the time of Christ it was applied to all religious teachers, sometimes to Christ himself. To-day the term *rabbi* is applied to specially-trained teachers of Talmudic Judaism, usually those in a pastoral relation to a Hebrew congregation. In the United States there are seminaries for training Jewish rabbis at Cincinnati, Philadelphia and New York.

RAB'BIT, a genus of gnawing animals, included in the same family with the hare,



RABBIT

the rabbit being smaller than the hare, and having shorter ears and hind legs. In its native state, the coarse fur of the rabbit is of a nearly uniform brown color, but under domestication the texture changes and the color may become pure white or pure black, piebald, gray or other hue.

Rabbits are native of all temperate climates, and in the wild state congregate in sandy pastures and on hill slopes. They breed several times a year, beginning at the age of six months, and produce from five to seven or eight at a birth. "Bunnies" should always be handled by the ears, as the body bones are delicate, especially in the young.

Rabbits feed on tender grass and herbage, and often damage young trees by stripping them of their bark. They make affectionate pets, and sometimes exhibit considerable intelligence. The skin of the rabbit, cleared of hair, is used with other skins to make glue and size. The fur is employed in the manufacture of hats and to imitate other and more valuable furs.

Among the best known of the domesticated rabbits are the Belgian (called *Belgian hare*), a true rabbit, easily raised; the *lop-eared rabbit,* distinguished by its long ears; the *Angora,* with a silky coat of long, white hair; the dark, silky-haired *Siberian;* the *Himalayan,* the skin of which resembles ermine; the fancy *silvertip;* and the delicate, white *Pole.*

RABELAIS, *ra b'leh',* FRANÇOIS (about 1490-1553), a French satirist and humorist, one of the most prominent literary figures of the French Renaissance. He was educated in monastery schools, then entered the Franciscan Order. He was an omnivorous reader, gaining a familiarity with Hebrew and Arabic, and with Greek and Roman classics, and acquiring an encyclopedic learning while yet a young man. After a few years of seclusion he grew weary of monastic life, and in 1530 went to Montpelier and entered a medical school. Subsequently he became head physi-

cian of a hospital at Lyons. Towards the close of his life he practiced medicine at Metz, and latterly filled a curacy at Meudon.

Rabelais' great literary production, *Gargantua,* and its sequel, *Pantagruel,* published in its present form at Lyons in 1535, were written as an attack on the social abuses of the day. The work abounds in wit, wisdom and sound common sense. The first part relates the adventures of a huge, long-lived giant, a notorious glutton; the second part recounts the deeds of Pantagruel, king of drunkards.

RACCOON', or **COON**, an interesting and mischievous small American animal, closely related to the bear. It is found from Canada to the tropics, wherever there are forests or patches of woodland. The raccoon is a little larger than a cat. It has a stout body, bushy tail, long legs and strong claws. Its body is covered with long, coarse hair of grayish color, tipped with black. The face is characterized by a sharp, delicate nose, a patch of black around each eye, and a cunning, foxlike expression.

Coons feed upon almost anything. Birds, eggs, frogs, crabs and other small animals are included in their diet, but they are particularly fond of honey, sugar, sweet apples and corn, especially sweet corn in the roasting stage. They are midnight prowlers, and their depredations often exasperate the farmer.

RACCOON

Their favorite nesting places are hollow trees, especially when they can find an opening made by the breaking off of a branch. These animals prefer trees with a rough bark, because they can climb these more easily. When a tree is not available the nest may be made in a hollow log. In cold climates they hibernate during the winter (see HIBERNATION).

The fur is used for robes, coats and other purposes, and the skins bring from four to seven dollars; oil extracted from the fat is worth about eight dollars a gallon, and the flesh is considered a delicacy. Coons are easily tamed and they are quickly fattened, but, notwithstanding these advantages, coon farming has not been developed to any extent, a farm at New Sydney, Nova Scotia, being the only one known. Wild coons, however, are easily trapped and the production of coon fur in Canada amounts to about $7,000 a year.

The *agouara,* or *crab-eating raccoon,* is found on the American continent farther south than the above species and is generally larger. There is also a Himalayan species, called the *punda.*

RACE, a contest of speed in running, walking, riding, driving, sailing, rowing, swimming or any other mode of progression.

In athletics running races for distances varying from fifty yards to several miles, are among the regular events, and furnish, perhaps, the most interesting contests (see ATHLETICS). During the period when bicycles were in great vogue, bicycle races were also common at such meets, as well as at fairs and special race meetings.

Regattas. Intercollegiate rowing races have long attracted wide attention in both England and America and are not only interesting for the skill displayed by the participants, but are spectacular and thrilling for the spectators. International rowing races have recently been arranged and have proved both interesting and profitable. The international yacht races between representatives of England and America have been conducted at frequent intervals for nearly fifty years and have invariably aroused the greatest enthusiasm.

Horse Racing, doubtless the most universally enjoyed of all racing sports. It is known as the "sport of kings." In some sections it has fallen into disrepute on account of the demoralization that comes from the betting ring. Besides, on occasion owners of the horses have "fixed" the races, that is, have decided beforehand what horse should win; and whenever the public have learned that the contest was not between horses but between betting rings, they have lost interest.

In the United States horse racing has become so interwoven with gambling that it is forbidden by law in several states. Before these conditions prevailed, however, some remarkable speed records were made.

The trotting record up to 1914 was made by Uhlan on October 8, 1912; it was a mile in 1 minute 58 seconds. Lou Dillon trotted a mile behind a wind shield in the same time. The pacing record in a race was set by Minor Heir in 1910 at 1:59, although Dan Patch, in 1906, in an exhibition heat, covered a mile in 1:55. The running record is the fastest of all; it is 1:37¼ for a mile, and was made in competition by Kildeer over a straight course in 1892. Dick Welles in 1903, Kiamesha in 1905 and Fern L. in 1908 covered the distance in 1:37 ⅖.

The famous English Derby has been held at Epsom, England, near London, almost every summer since 1780. It is witnessed by sportsmen from all parts of the world and is made a fashionable society event. The same is true of the so-called Derby races in different parts of America, as at Brighton Beach, L. I., and Louisville, Ky.

Automobile Racing. Automobile races are considered by many the most thrilling of sports. They are international in extent, and attract the most expert drivers in the world. Although attended with great danger, and frequently with loss of life, these races attract thousands of spectators. Courage, staying power and exceptional presence of mind are absolutely necessary to the driver's success and safety. His winning a race depends not so much upon a high speed for a few miles as upon his ability to maintain a terrific speed for the entire distance covered by the course, which may be from 100 to 500 miles. In some of these races an average speed of almost ninety miles an hour has been maintained on a 500-mile course.

RACES OF MEN. It is a difficult matter to classify mankind, for there is scarcely any one characteristic belonging exclusively to a single race, though climate and other influences have modified the structure of certain races to such an extent that they are easily recognized as differing from other races in distant localities. Scientists have offered many classifications, but none has yet appeared to be altogether satisfactory. The one most generally known is that made by Blumenbach, near the beginning of the nineteenth century. The chief basis of his classification was the color of the skin, the shape and size of the head and peculiarities of the features. Blumenbach recognized five distinct races, namely, the Caucasian, or white race; the Mongolian, or yellow race; the Malay, or brown race; the Negro, or black race; the American, or red race.

Since Blumenbach's classification was given, a number of others have been made, but none seems entirely satisfactory, although each is the result of more recent research and of new discoveries. The classification most generally accepted at the present time is that by Deniker, who is guided by the color and form of the hair, form of the head, form of the nose, color of the skin and stature. This classification divides the human family into six groups and twenty-nine races, listed as follows:

I. **Woolly Hair, Broad Nose**
- 1. Bushmen
- 2. Negrito
- 3. Negro
- 4. Melanesian

II. **Curly or Wavy Hair**
- 5. Ethiopian
- 6. Australian
- 7. Dravidian
- 8. Assyroid

III. **Wavy Brown or Black Hair, Dark Eyes**
- 9. Indo-Afghan
- 10. Arab or Semite
- 11. Berber
- 12. Littoral European
- 13. Ibero-insular
- 14. Western European
- 15. Adriatic

IV. **Fair, Wavy or Straight Hair, Light Eyes**
- 16. Northern European
- 17. Eastern European

V. **Straight or Wavy Hair, Dark Eyes**
- 18. Ainu
- 19. Polynesian
- 20. Indonesian
- 21. South American

VI. **Straight Hair**
- 22. North American
- 23. Central American
- 24. Patagonian
- 25. Eskimo
- 26. Lapp
- 27. Ugrian
- 28. Turkish or Turco-Tatar
- 29. Mongol

Races of Europe. The reconstruction of the map of Europe as a result of the World War has awakened a general interest in the peoples of the continent and their radical relations. In the following table each group includes kindred peoples who at the close of the war desired to form independent nations:

The Races of Russia

Great Russians

Little Russians (Ukrainians)
White Russians
Cossacks
The Races of the Baltic Provinces
Esths (Esthonians)
Letts
Lithuanians
The Finno-Ugrians
Finns
Lapps
The Races of the Caucasus
Aryans (Syro-Arabs-Ural-Albanian)
Circassians
Chechens
Armenians
Turco-Tatars
The Rumanians
The Races of the Balkan Peninsula
Ottoman Turks
Albanians
Greeks
Bulgarians
Serbians
Montenegrins
The Jugo-Slavs
Bosnians
Helvets
Croats
Dalmatians
Slovenes or Wends
Slavonians
The Czecho-Slovaks
Czechs
Moravians
Slovaks
The Ruthenians
The Magyars
The Poles
The Jews
The Gypsies
The Germans
Bavarians
Prussians
Scandinavians
Danes
Norwegians
Swedes
The Dutch
The Swiss
The Italians
Maltese
The Races of the Iberian Peninsula
Portuguese
Spanish
The French
Basques
The Belgians
Flemings
Walloons
The Irish
The British
Welsh
Scotch
English

RACHEL, *ra chel'* (1821-1858), one of the greatest of French tragedians, whose real name was Elizabeth Rachel-Félix. She was born in Switzerland, the daughter of a Jewish peddler. As a child she sang in the streets and cafés of Lyons and Paris. When she was nine years old her voice attracted the attention of an eminent music teacher, through whose influence she received musical and dramatic training. At sixteen she made her début at Paris, and a year later made a profound impression as "Camille" in Corneille's *Horace*. In the years that followed she gave a series of classic impersonations in the plays of Racine, Corneille and Voltaire, and with stupendous success. As "Phèdre" in Racine's play of the same name, she reached the height of her artistic powers, and it is doubtful whether her performance of that part will ever be surpassed on any stage. Rachel played throughout France and Belgium and in England and America. She died of tuberculosis and was buried in the Jewish section of Père Lachaise cemetery, Paris.

RA'CHEL, the favorite wife of Jacob (*Genesis* XXIX, 20). For her he served her father, Laban, seven years, "and they seemed to him but a few days for the love he had to her." The story is one of the most beautiful love stories of the world's literature. Rachel was the mother of Joseph and Benjamin. She was considered the tribal mother of the northern tribes, and when they were carried into captivity she was represented in the poetry of the time as refusing to be comforted (*Jeremiah* XXXI, 15). This passage is quoted in the account of Herod's slaughter of the Innocents:

> Rachel weeping for her children,
> And she would not be comforted because they are not.

RACINE, *ra seen'*, JEAN (1629-1699), one of the foremost writers of tragedy, born at La Ferté-Milon. He received a classical education and became thoroughly familiar with the masterpieces of Greek drama, especially so with those of Sophocles and Euripides, which he chose as his models. In 1662 he went to Paris, was presented at court and became the friend of Molière, Boileau and La Fontaine. His seven masterpieces—*Andromaque, Britannicus, Bérénice, Bajazet, Mithridate, Iphigénie* and *Phèdre*—were all produced before the year 1677.

Racine's chief characters were women, in whom passion was the controlling force. In his plays everything is subordinated to dramatic effect, and character delineation is of secondary importance. A poet of cultured and fashionable society, Racine never came in

close touch with the masses, but notwithstanding this limitation of experience he possessed dramatic gifts which place him among the greatest of French tragic poets.

RACINE, Wis., the county seat of Racine County, twenty-four miles south of Milwaukee, on Lake Michigan, at the head of Root River, and on the Chicago & North Western and the Chicago, Milwaukee & Saint Paul railroads and electric lines. The city is regularly laid out, on an elevation of about forty feet above the lake. It has a good harbor and there is freight and passenger service by water. Racine is an important manufacturing center, producing automobiles, malted milk, agricultural implements, wagons, flour, threshing machines and various lesser articles. It contains the Saint Luke's Hospital, Taylor Orphan Asylum, Racine College, Saint Catherine's Academy, a public library, a Federal building and a Y. M. C. A. It was settled in 1834 and was chartered as a city in 1848. Population, 1910, 38,002; in 1917, 47,465 (Federal estimate).

RACK, an instrument of torture, formerly used to punish or to extract confessions from suspected criminals. It consisted of a large, open oblong frame made of four wooden beams. The person to be tortured was laid on his back on the floor space enclosed by the rack, and his wrists and ankles were bound to rollers at opposite ends of the frame. The rollers were then rotated in contrary directions until the prisoner confessed (and was released) or his body was rent. The rack was used by the Romans in the first and second centuries, and many Christians suffered upon it. It was also used during the Inquisition. In 1447 it was introduced into England and was employed there for nearly two hundred years.

RADCLIFFE COLLEGE, *rad'klif,* an educational institution for women, founded at Cambridge, Mass., in 1879, by the Society for the Collegiate Instruction of Women. It was at first known as the Harvard Annex though it had no official relation with Harvard University until 1894, when by act of the General Court of Massachusetts its name was changed to Radcliffe College, in honor of Ann Radcliffe, the first woman to give a money endowment to Harvard. The requirements for admission and for degrees are identical with those of Harvard College, and the courses of instruction, in the main duplicates of those in Harvard College, are given for the most part by members of the Harvard University faculties. Radcliffe College is located about three blocks from the Harvard campus. See Harvard University.

RADIA'TA, in the classification of the French naturalist Cuvier, the lowest of four great divisions of the animal kingdom. The classification was based on the fact that in members of this group the parts of the body are grouped radially like the spokes of a wheel. It has been superseded by more scientific classifications. See Coelenterata; Protozoa.

RADIOLARIA, *ra di o la' ri ah,* a group of one-celled marine animals belonging to the lowest order in the animal kingdom (see Protozoa). There are thousands of species, and most of the individuals are microscopic in size and encased in a shell of silica, usually of great beauty. The name has reference to the threadlike protoplasm which radiates in all directions from the cell body.

RAD'ISH, a small vegetable of the mustard family, cultivated for its edible roots. It is a native of China and Japan, but now flourishes in all temperate regions, grows to about three feet in height, and bears nearly white flowers on a branched stalk. Some species are annual, others are perennial. The roots of some varieties are globular in form, other species are elongated; in certain species the roots are white, in others they are red. The seeds are sown in rows about a half-inch apart, and mature in from three to five weeks. Often three or more crops can be raised in a season. The food value of the radish is low. As a heat producer it has 135 calories per pound. See Calorie.

RA'DIUM, the most valuable and possibly most wonderful substance in the world, is a metal discovered in 1902 by Professor and Madame Curie, at the Paris Industrial School of Physics and Chemistry. In its pure state radium resembles silver, but it is used in the form of chloride, which looks like common salt. In proportion to its weight radium is a hundred times more valuable than diamonds, being worth $3,200,000 an ounce. A tiny tube of it the size of a small straw and less than an inch in length is worth more than $4,000.

Properties. The wonders of radium are not yet fully known, and the cause of its intense activity has not been discovered. The activity is learned only through the effects it produces. If a small tube of radium is placed in a man's vest pocket and allowed to

remain an hour or two, it causes a burn, but the effect may not appear until some days after the cause has been removed, when the skin begins to dry and crack, and in a short time to slough off. If a tube of radium is placed on a surface coated with sulphite of zinc or some similar substance the surface becomes luminous.

Radium discharges electrified bodies, and affects photographic plates. If a photographic plate is wrapped in black paper and an opaque object such as a penny is laid on the paper with the coated side of the plate up, and the plate is enclosed in a dark box with a tube of radium, a radiograph of the object will be produced in the plate. This experiment is often used in testing ore suspected of containing radium, a small quantity of the ore being used in place of the radium. If radium is present, a picture of the object will appear on the plate where it is developed.

Radium produces severe burns and ulcers, and tubes containing it should not be handled with the bare hands, even for a short time. It destroys the life of seeds and is therefore an enemy to plant life. A marked peculiarity of radium is that its intense activity does not cause any appreciable loss of power or weight. A tube once filled with it could be used for centuries, and at the end of this period the radium would be as effective as at the beginning.

When dissolved in water radium produces a peculiar gas called emanation, which is used in the treatment of certain diseases. The uses of radium are greatly increased by this fact, for a supply of radium emanation can be obtained for a small fraction of the cost of the radium itself. Another remarkable property possessed by radium is that of impregnating another body with its properties. The surface of a body placed near radium, or better still, immersed in the emanation, acquires radio-activity. As in the case of the gas, this power gradually decreases; but while it lasts, it has the characteristics of the metal. Radium emanations and substances saturated with emanations are being used by physicians in place of pure radium.

Uses in Medicine. Radium is employed in medicine chiefly in the treatment of ulcers, and for the removal of warts, corns and scars. It is usually successful in curing superficial cancers, but its application to cancers that are deep-seated has not been attended with the success hoped for.

Production of Radium. In 1896 it was found that uranium and all its compounds continually emit radiations and have a penetrating power similar to that of the X-rays. Professor and Madame Curie followed this discovery with a series of experiments on the ore of uranium, commonly known as pitchblende, and they obtained a pure radium chloride in 1902. The excessive rarity of radium may be judged by the fact that Mme. Curie obtained only about 0.2 gram from a ton of uranium residue. For some years after the discovery of radium it was generally believed that the mines under control of the Austrian government, located at Joachimenthal, Bohemia, constituted the greatest source of the world's supply of this valuable substance. Later, however, deposits of ore were discovered in Sweden and Wales. It was long believed that pitchblende was the only ore from which radium could be obtained. Then analyses of other ores of uranium showed that they contained radium. The most abundant of these later sources is carnotite, extensive deposits of which have been discovered in Colorado and Utah. At first most of this ore was shipped to Europe, but in 1912 the United States Bureau of Mines established a laboratory in Denver, which, with the coöperation of the American Radium Institute, was enlarged. In 1915 this plant was in successful operation, and since that date a new process has been discovered by which the expense of extracting radium from the ore has been greatly reduced; even with this saving, the cost of production is $40,000 per grain. The process is exceedingly delicate, complicated and difficult, as one may realize from the fact that the substance sought is one part to 200,000,000 parts of the ore.

RAF'FIA, a strong fiber obtained from the Jupati palm, a tropical tree found chiefly in Madagascar and Brazil. The coarse outside fibers are used by the natives in building houses and fences; the inner fibers are torn off in ribbonlike strips and are used for weaving. Baskets, rugs, mats, bags and even dress fabrics are made from this soft, pliable fiber. Great quantities of the fiber are exported. In the United States and Canada raffia is much used in the construction work of the public schools. It takes dye beautifully and is an ideal material with which to teach principles of weaving to small pupils in schools and the home.

RAGTIME, *rag'time,* the name of dance or vocal music of negro origin and characteristics, in vogue since the early nineties of the past century. The melodies are always presented in quick time and are punctuated with sharp accents and abrupt syncopations.

RAG'WEED, an annual weed, common in rich, damp soils. It is found in Europe and receives its name from the ragged appearance of its leaves. The flowers are small and golden yellow in color. The *great ragweed* is a species confined to southern, central and eastern states. Its flowers grow in great clusters and are commonly found by the side of roads and in pastures. Other names often applied to this weed are *bitterweed, hogweed* and *Roman wormwood.*

RAIKES, *rayks,* ROBERT (1735-1811), an English publisher and philanthropist, founder of the Sunday School. He was born at Gloucester, England, where from 1757 to 1802 he published the Gloucester *Journal,* a paper which he employed in the cause of reform. On a Sunday in July, 1780, he opened his first school for the purpose of giving to poor children the rudiments of a religious education. See SUNDAY SCHOOLS.

RAIL, the name of a group of birds related to the coots and gallinules. The rail is about a foot long, and generally is gray and

RAIL

brown in color. It is a poor flyer, but it runs swiftly. While a few of the birds are found on dry land, most of them live in the marshes, and many are expert swimmers and divers. The nests are built among grasses, and the eggs, from seven to fifteen, are buff, specked with brown. The commonest of the European rails are known as *corn crake, water rail* and *land rail.* Among familiar American species are *Virginia rail, king rail* and *clapper rail.* See BIRDS, *color plate;* COOT.

RAILROAD, or **RAILWAY**. The railroad and the telegraph have made "all the world kin." No other agencies have done so much towards bringing the peoples of the earth together, and opening vast unoccupied regions to settlement. A picture of what the United States or Canada might be to-day had there been no railroads is not pleasing to contemplate, for in the development of much of the two countries the railroad has been the pioneer. Without railroads farmers would not be able to market their produce with profit; the great mineral resources would still be locked in their mountain fastnesses, the building of those inland cities which have become important centers of trade would have been impossible, and instead of the manufacturing systems with which we are familiar every community would be obliged to have its own little shops and factories for supplying its local needs.

The First Railroads. As early as 1602 tramways were constructed to haul coal from some of the mines in England. They were made of wooden rails or beams laid on a road bed for the wagons to run on. Later, strips of iron were fastened to the beams to protect them from the wear of the wheels. In a few years the beams were replaced by cast-iron rails. The wagons were hauled by horses. The modern railroad dates from the construction of the Stockton & Darlington Railway in England, which was completed in 1825. It was on this road that steam power was first successfully used, although in a very crude way.

The first railway in the United States was built from the granite quarries in Quincy, Mass., to the coast, and it was designed for conveying stone for the Bunker Hill Monument. This line was completed in 1826. The following year the Delaware & Hudson Canal Company began building a road from Honesdale, Pa., to their coal mines at Carbondale, a distance of sixteen miles. On both of these lines the cars were hauled by horses. The first attempt to use a steam locomotive in America was made in 1829, when an engine was used on the small road built by the Delaware & Hudson Canal Company. The first railway built originally for the purpose of using steam locomotives was the South Carolina, work being started in 1830. The Baltimore & Ohio, started in 1828, began using steam locomotives in 1831. This was the first road built for the purpose of carrying both freight and passengers, and it was also the first of those great trunk lines that now constitute the main arteries of the American railway system.

Present Systems. From these small beginnings the American railway system has grown to its present proportions. The early lines were gradually extended westward. The completion of the Suspension Bridge over the gorge at Niagara was an epoch-making event in the history of transportation in the United States, for it opened what was then the "Great West" to railway communication. In 1860 there were about 30,000 miles of railroad in the United States. During the Civil War construction was practically suspended. However, after the close of the conflict the work was taken up with renewed activity, and in 1869 the first transcontinental railroad line was completed, joining the Atlantic and Pacific oceans. From that time on railway construction has kept pace with the development of the country, until in 1920 there were in the United States about 266,000 miles of railway lines, exclusive of second tracks and sidings, which add over 115,000 more, making in all about 380,000 miles, nearly one-half of the railway mileage of the world. The operation of the railroads of the United States requires the employment of over 1,410,000 men.

Other Countries. The railroad mileage of the other leading countries is as follows:

Russia (including Siberia)	50,000
Germany	40,000
France	32,000
Great Britain	23,436
Austria-Hungary (before the war)	28,706
British India	34,648
Canada	30,000
Mexico	15,840
Brazil	15,525
Argentina	20,639

Consolidation of Railroads. The first railroads were short lines and were built with little thought of connecting with other lines. This caused numerous annoyances. Freight shipped over different lines had to be reloaded at each terminus, and passengers were required to change cars frequently. Originally no fewer than six separate railroads composed what is now the New York Central, extending from New York City to Buffalo, and this condition characterized most other lines in the country. The first movement toward uniting these roads into a system consisted in making a traffic arrangement, by which the different companies agreed to haul each other's cars over their lines. As the roads extended westward and the movement of freight became more complicated, transportation companies were formed for the purpose of handling through freight. The success of these combinations led the stockholders of connecting lines to unite their roads under a single corporation. The final step consisting in uniting competing lines into systems, and when the United States assumed control of all the roads as a war measure in 1917 nearly all the railway mileage of the country had been so organized. Among the most extensive of these systems were the New York Central, the Pennsylvania, the Southern Pacific, the Atchison, Topeka & Santa Fé, the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Chicago, Milwaukee & Saint Paul, the Chicago & North Western, the Union Pacific, the Northern Pacific and the Great Northern. All except the New York Central and the Pennsylvania form connections which extend their lines from Chicago and other points in the Mississippi Valley to the Pacific coast, and are generally known as *transcontinental systems.*

Construction. In deciding upon the location of a railroad, attention is given to three conditions—the cost of construction, the cost of operating the line, and the traffic that may be secured from the adjoining country. The route over which a line can be constructed with least expense may be more expensive, on account of the cost of operation, than another, over which the cost of construction is greater. In many cases, large cities and towns and good mining, lumbering and farming regions must be reached, even at the expense of extending the line. Hence, it is often found that the route chosen is not the most economical at the time of construction, but becomes so in the course of years. When the route is decided upon, two surveys are made, the first for determining the curves and grades, and the second for locating the roadbed and indicating the exact grading. For this purpose stakes are set every few rods along the middle line of the roadbed. Each stake is marked with the number of feet and inches to be cut or filled to make the desired grade. As far as possible, the engineer makes the cuts and fills equal, so that the earth from the one can be used in constructing the other. When earth for filling is not immediately available, a trestle is built across the gap and the filling is done after the road is completed. The standard gauge on which practically all railroads, except those in mountainous re-

gions, are laid is four feet, eight and one-half inches between the rails. Modern construction, so far as possible, eliminates curves and steep grades, often incurring great expense to remove these undesirable features. The reason for this is that the expense of operating the road over high grades and on curves is so much greater than it is on a straight, level track, that the more expensive construction is the more economical in the end.

Equipment. The equipment of a large railroad system embraces *rolling stock,* the term applied to locomotives and cars; passenger stations; freight depots; shops for building and repairing cars and locomotives; yards for the transfer of freight and the storage of cars; water supply for locomotives; a system of signals for the guidance of trainmen, and telegraph and telephone lines.

The rolling stock consists of locomotives for the passenger and freight service, and the various styles of cars necessary to accommodate traffic. On all lines the passenger service requires baggage, express and mail cars, besides ordinary day coaches. Sleeping cars, dining cars and parlor cars are required on long lines. The first passenger cars in England closely resembled stage coaches, and the first improvement consisted in joining two or more of these into one. Finally, the sides and roof were made continuous; but the cross-partitions, separating the car into compartments, remained, and they still characterize most of the cars in use on English railways. The first passenger cars in the United States closely resembled those of England; but they were soon replaced by the long, box-shaped cars, with an isle through the middle and a platform at each end, and the best cars now in use are constructed on this plan. All the best cars are now made of steel.

The first sleeping car was placed on the Cumberland Valley railroad in Pennsylvania in 1837. In 1859 George M. Pullman changed some day coaches on the Chicago & Alton railroad to sleeping cars, and the experiment was so satisfactory that he felt warranted in building a regular *sleeper.* This car was constructed in the shops of the Chicago & Alton railroad and was christened *The Pioneer.* It was completed in the spring of 1865 and served as the funeral car in bringing the remains of President Lincoln to Chicago. Two years later the Pullman Palace Car Company was organized for the purpose of building and operating a system of Pullman sleeping cars on all railroads in the United States. Pullman cars are also in use on many long lines in Europe and other parts of the world. See PULLMAN, GEORGE M.

Dining cars came into use on the Great Western Railway of Canada in 1867. The first patterns were a combination of dining and sleeping cars, but in 1868 the Chicago & Alton placed a complete dining car in service. The vestibule car was invented by Mr. Pullman in 1887 and is now in general use.

There are many patterns of freight cars, but the common box car is more generally used than all others. The average length of box cars is 34 feet, and their capacity varies from 20 to 50 tons. Flat cars are used for lumber and other articles too large to put into box cars, and low open box cars, called *gondolas,* are used for hauling coal. There are also special cars for the transportation of live stock, besides *refrigerator cars,* for the carriage of perishable commodities.

Operation. The forces of a great railroad are as thoroughly organized as an army. At the head of the force is the president, who is the general executive officer. Then there are usually a number of vice-presidents, each having charge of a special department. The general manager has charge of the departments relating to the physical care of the properties of the railroad, and each of these departments is in charge of an official who is accountable to the general manager. The chief engineer, or superintendent of roadway, has charge of the maintenance of tracks, bridges and buildings. Under him are road-masters, supervisors of bridges and supervisors of roads, on each division of the railroad.

For the purpose of operating trains the railroad is divided into divisions, and each division into sections. The superintendent of transportation has charge of the movement of trains. He makes all time schedules, and under him are trainmasters, train dispatchers, telegraph operators, conductors and trainmen. The division superintendent exercises general supervision over all affairs in his division. He reports to the general superintendent, who reports to the general manager. Under these officials are the superintendents of machinery, train masters and the host of conductors, engineers, firemen and trainmen who are engaged in moving the trains, as well as dispatches and operators.

The traffic manager has charge of the freight and passenger business, so far as it relates to fixing freight and passenger rates, soliciting business and advertising special trains and excursions. Under him are the general freight and general passenger agents, with their assistants, traveling agents, local agents, rate and division clerks and claim agents. Every large railroad maintains a medical department which may include one or more hospitals for the benefit of its employes. This department is in charge of the chief surgeon, who is assisted by surgeons who live along the line and are usually engaged in regular local practice. They are called by the chief surgeon when needed.

Besides the departments directly connected with the operation of the railroad, there are the auditor's department, which has oversight of the financial matters, and the legal department, which draws and approves contracts and has charge of all legal matters. Railroads passing through sparsely settled regions may maintain land and industrial departments, which devote their time to procuring settlers for the unoccupied territory.

Government Control. Most of the railways of Canada and those of European nations are operated under direct control of their respective governments. But previous to 1917 all railways in the United States were operated by the corporations which owned them. The only Federal restrictions upon these corporations were those imposed by the Interstate Commerce Commission (which see), which had the power of fixing rates for all interstate freight and passenger service; and the restriction placed upon the formation of trusts by the Sherman Anti-Trust law (see TRUSTS). Competition had become so close that most of the revenues went for paying expenses. Moreover, there was not the cooperation necessary to secure the greatest dispatch in the movement of freight.

Upon the entrance of the United States into the World War, it soon became evident that the railroads could not meet the demands of the government as they were then operating. The first step towards meeting this emergency was the creation of the so-called Railroad War Board, in April, 1917. While this board, consisting of railroad presidents, did much to improve conditions, it soon became evident that only by the operation of all the railroads and connecting steamship lines of the country under one head, would it be possible for the transportation facilities of the country to meet the demands created by the war. On December 26, 1917, President Wilson, acting under authority granted him by Congress, placed all the railroads and steamship lines in the United States under control of the government. William G. McAdoo, Secretary of the Treasury, was appointed Director-General of Railroads. The government guaranteed the railroad corporations an annual income equal to the average net income of their respective lines for the three years preceding June 30, 1917.

Under government management many wasteful practices—the result of competition—were eliminated, both freight and passenger rates were raised, and the wages of railroad employes were materially increased. Freight was taken to its destination by the shortest route. Unnecessary passenger trains on parallel lines were cancelled, the separate ticket offices of the different lines in many large cities were consolidated, and many employes engaged in unnecessary service were placed in departments where they were needed. The freight congestion was very largely removed, and the government was enabled to meet its promises to the allies for men and supplies.

At the end of the first year of government management, Director-General, Wm. McAdoo claimed that the plan had not been in operation long enough to determine whether or not, under normal conditions, it would be to the advantage of the country to have government control made permanent, and he recommended that Congress authorize the government to extend its control for a period of five years. McAdoo resigned both his offices in November, 1918, and Walker D. Hines was appointed Director-General of Railroads. By the summer of 1919 it could be foretold safely that government management of railroads was neither popular nor profitable. A great deficit confronted Congress to be liquidated, and also the task of framing laws under which the roads could be returned to their owners on a fair and equitable basis, and the latter saved from inevitable bankruptcy.

Related Articles. Consult the following titles for additional information:
Air Brake
Cape-to-Cairo Railway
Carrier, Common
Electric Railway
Eminent Domain
Interstate Commerce Act
Locomotive
Mono-Rail, Suspended
Public Utilities
Railroads of Canada
Semaphore
Trans-Siberian Railway

RAILROADS OF CANADA. Canada has the greatest railway mileage in proportion to population of any country in the world. In a country of such vast extent means of transportation and communication play a great part in development. It is only necessary to point to the remarkable growth in population in the west after the introduction of railways, to the present irrigation projects of the Canadian Pacific in Alberta, to the grain elevators and hotels which the railroads are building throughout the country, to show that the railroads do more than haul traffic. The mere fact of transportation is an impulse beside which all other impulses toward growth become small.

The following table will give some idea of the increase in steam railway mileage in Canada:

YEAR	MILES	YEAR	MILES
1846	16	1906	21,429
1856	1,414	1913	29,304
1866	2,278	1914	30,795
1876	5,218	1915	35,582
1886	11,793	1916	37,434
1896	16,270	1918	38,879

In 1836 the first railway in Canada was built between Laprairie, near Montreal, and St. John. Ten years later another short line connected Montreal and Lachine. The railway system of Canada had its real beginning, however, in 1851, when Parliament passed a bill providing for the building of the Grand Trunk road from the western limit of Upper Canada to the city of Quebec and also a branch line to Portland, Maine. The Portland branch was completed in 1853, and the main line from Sarnia to Quebec three years later. To trace the development of all the railways in the Dominion is impossible, but below are given sketches of the five principal systems now in operation:

Grand Trunk. This is the oldest of the great railway systems of Canada. Since 1856, when the main line from Quebec to Sarnia was completed, the railroad has gradually increased its mileage to a total 3,100 in Canada alone, besides numerous direct connections, owned or leased, to points in the United States. The main line now extends from Portland, Maine, through Quebec and Montreal, to Chicago; branches and leased lines afford direct connection with New York and Boston. Three parallel lines extend through that part of Ontario lying north of Lake Erie, and these are connected by numerous cross lines, one extending as far north as Lake Temiskaming. Another important line extends from Montreal to Parry Sound by way of Ottawa. The road is noted for its erection of the old supension bridge over the Niagara River, for the Victoria tubular bridge across the St Lawrence at Montreal, and for the magnificent steel structures which now occupy the sites of the original bridges. For a number of years the Grand Trunk sank into an unprosperous condition, but under the management of the late Charles M. Hays it again resumed its former position of importance.

Intercolonial Railway. This is the only large railway system in Canada owned and operated by the government. It was planned by the provinces of Quebec, Nova Scotia and New Brunswick, and after Confederation it was assumed by the Dominion Government. It was opened to traffic in 1876. The main line extends from Moncton to Montreal by way of Levis and the south bank of the St. Lawrence River. It has branches which connect Point du Pictou, Halifax, St. John and Sydney.

Canadian Pacific. The building of the first Canadian transcontinental was a serious problem presented to the early Dominion Parliaments, for it was one of the conditions of British Columbia's entrance into the Confederation. In 1872 Sir John A. Macdonald presented the question to Parliament, but political and other troubles interfered (see Canada) so that it was not until 1881 that the contract between the government and the Canadian Pacific Railway Company, a syndicate of capitalists, was finally signed. Prominent members of the company were Mr. George Stephen, a Montreal merchant, and Mr. Donald A. Smith, an official of the Hudson's Bay Company, both now better known as Lord Mount Stephen and Lord Strathcona. The road was to be finished by 1890, but the work was pressed forward so energetically that the last spike was driven by Lord Strathcona in 1885.

The main line extends from Montreal to Vancouver, British Columbia. In addition to the main line there is a line extending from Montreal to Toronto and Detroit, another, known as the Duluth, South Shore and Atlantic, along the south shore of Lake Superior, a third from Minneapolis to the Soo, and a fourth from Minneapolis to the main line at Moose Jaw, Saskatchewan. The total mileage of the system is about 11,500. In addition to its own lines the Canadian Pacific has leased or has traffic rights over several roads which give it direct connection with Boston and ports in Nova Scotia and New Brunswick. It owns two steamship lines, one, the Empress, running to China and Japan, the other, the Australian, to Honolulu, Fiji and Sydney. The western division of the road passes through a region famous for its scenery in the Selkirk and Cascade Mountains.

Canadian Northern Railway. This is a great trunk line projected to extend from the Atlantic to the Pacific coast. In 1896 the firm of Mackenzie, Mann & Company began building on its own account by completing 100 miles of line, known as the Lake Manitoba Railway and Coal Company. From this small beginning has grown the Canadian Northern

system. The first train to run on the road across the continent was operated from Quebec to the Pacific coast in 1915. In the northwest provinces this line extends north of the Canadian Pacific and the Grand Trunk Pacific and passes through a fertile section which was practically inaccessible before its construction. The Canadian Northern offers every encouragement to the settler and investor. In consequence, towns are rapidly springing up along the line of the road.

Grand Trunk Pacific, or National Transcontinental Railway. The Grand Trunk Pacific Railway was incorporated by act of Parliament in 1903, under agreement with the Canadian government to construct a line of railway between Winnipeg and Prince Rupert, and to operate a line from Prince Rupert to Moncton, New Brunswick.

It was opened for through traffic in 1915. Technically only the line west of Winnipeg is the Grand Trunk Pacific, whereas the line east of Winnipeg is the National Transcontinental Railway. Important branches have been constructed as follows: (1) the Quebec extension, comprising four lines; (2) the Ontario extension; (3) the Manitoba, Alberta and Saskatchewan extensions, comprising eight lines; (4) the Dawson branch; (5) the Hudson's Bay Railway. This branch, to be built by the government, will run from Hudson's Bay Junction, about 120 miles northeast of Saskatoon, to Fort Churchill and Port Nelson, thus providing direct water and rail communication from the western provinces to Europe. It is intended to run steamship lines from both the Atlantic and Pacific terminals to foreign ports. As Prince Rupert is several hundred miles nearer to the ports of the Orient than any other Pacific port in North America, the new railway should have a decided advantage in trans-Pacific trade.

RAIN. One who has never lived in a rainless region cannot fully appreciate the blessings conferred uopn the earth by the rain. This thought is beautifully expressed by Shelley in his poem *The Cloud:*

I bring fresh showers for the thirsting flowers,
From the seas and the streams;
I bear light shade for the leaves when laid
In their noonday dreams.

Water is necessary to the growth of plants, and where there is no rain the earth is a desert. Few animals live where there is no plant life, so we may truthfully say that all life upon the earth depends upon rainfall.

How Rain is Formed. The sea and land are the great sources from which the rain comes, and the sun is the great engine that draws the water up into the air, from which it falls again to the earth. Evaporation (which see) is constantly taking place, and the air always contains more or less water vapor. The quantity of vapor which the air can hold depends upon its temperature; the warmer the air the more water vapor it can contain. When air has all the water vapor it can hold it is said to be *saturated.* When the temperature of saturated air is lowered the air must lose some of its moisture, which falls in the form of rain or snow.

Wind is one of the chief agencies in causing rainfall. Whenever a warm wind laden with moisture blows towards a cooler region clouds begin to form, and in a few hours the rain may fall. Sometimes a warm upward current ascends until it reaches a layer of cool air, where its moisture is condensed and thrown back to the earth in a local shower.

We notice that raindrops vary in size. The largest drops are nearly a quarter of an inch in diameter, and the smallest ones are scarcely visible, and we wonder why this difference. Observation of rain under all the conditions that a locality affords shows us that the largest drops fall in showers that form suddenly, and that they come from clouds high up in the sky. The shower has been formed so quickly that the air between the cloud and the earth is still heavily charged with moisture, and some of this moisture is added to the drops in their rapid journey from the cloud to the earth. In a general rainfall the clouds are low, and the vapor in the atmosphere is condensed before the rain begins to fall.

What Rain Does. Rain supplies the moisture to sustain plant and animal life; it fills the springs and the streams, indirectly carries soil from the hills to the valleys, where it is deposited by the streams on the lowlands, and cleanses the atmosphere of its impurities, one of its greatest benefits. Meteorologists have estimated that a five days' rain in London, England, will wash from the atmosphere 3,738 tons of solid impurities, including 2,000 tons of soot.

Meaning of One Inch of Rain. On every daily weather bulletin or chart the amount of rainfall at various places during the preceding twenty-four hours is printed in inches and hundreds of inches. In a general way the public understands that a rainfall of two inches in one day is heavy, and that one of a tenth of an inch is light, but no attempt is made to associate the linear measurement of the water with its equivalents in weight or bulk.

An acre of ground contains 43,560 square feet. Consequently a rainfall of one inch over one acre of ground would mean a total

of 43,560×144, or 6,272,640 cubic inches of water. This is equivalent to 3,630 cubic feet. As a cubic foot of pure water weighs about 62.4 pounds, the exact amount varying slightly with the density, it follows that the weight of a uniform coating of one inch of rain over one acre of surface would be 3,630×62.4= 226,512 pounds, or 113¼ short tons.

The weight of one United States gallon of pure water is 8.345 pounds. Consequently a rainfall of one inch over one acre of ground would mean 226,512÷8.345=27,143 gallons of water on the acre. This is equivalent to 603 barrels of forty-five gallons each, and would be sufficient to fill a tank or pool about twenty feet square and nine feet in depth.

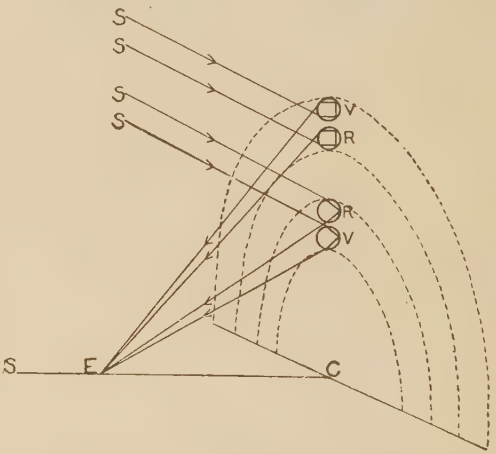
Distribution of Rain. The average rainfall in a year at any given place depends on a great variety of circumstances, the most important of which are latitude, proximity to the sea, elevation of the region, configuration of the country and exposure to the prevailing winds. When the vapor-laden atmosphere is driven toward mountain ranges, it is forced upward by the latter and is consequently cooled, partly by coming into contact with the cold mountain tops, and partly by the consequent expansion of the air, due to the greater elevation. As the temperature is lowered, the moisture is condensed and falls as rain or snow. The presence or absence of vegetation has also considerable influence on the rainfall of a district. Land devoid of vegetation has its soil intensely heated by the fierce rays of the sun; the air in contact with it also becomes heated and is able to hold more and more moisture, so that the fall of rain is almost impossible. On the other hand, land covered with an abundant vegetation has its soil kept cool and thus assists in condensation.

Winds carry water vapor a long distance, and when they blow inland, free from the obstruction of mountains near the coast, as in the valley of the Amazon, they cause rain to fall over extensive regions in the interior of a continent. At the equator, the average yearly rainfall is estimated at 95 inches. At a few isolated stations the fall is often very great. At Cherrapungee, in the Khasia Hills of Assam, 615 inches of rain fall in the year, and there are several places in India with a fall of from 190 to 280 inches. The rainfall at New York is 43 inches; at Washington, 41 inches; at San Francisco, 22 inches; at Sitka, Alaska, 90 inches. The greatest rainfall on earth is in India—over 500 inches.

Related Articles. Consult the following titles for additional information:

Arid Region	Humidity
Cloud	Irrigation
Desert	Meteorology
Dew	Physical Geography
Dust, Atmospheric	Rainbow
Evaporation	Rain Gauge
Flood	Snow
Fog	Storms
Hail	Weather Bureau

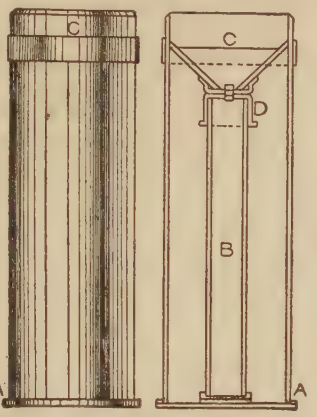
RAINBOW, *rān'bo,* the arch of prismatic colors often seen in the heavens when the sun shines during a shower of rain. It is formed by the reflection and refraction of the sun's rays by the rain drops. These drops act like a prism and separate the rays into their prismatic colors (see LIGHT, subhead *Spectrum*). Each color is formed by rays that reach the eye at a given angle, and this angle never changes for the same color; hence, the bow appears circular. The observer, *E,* stands upon a line, *SC,* which, if projected, would pass through the center of the circle. The rays, *s s s s* are reflected and refracted differently in the upper and lower drops.



This gives rise to two bows, one within the other, with their colors reversed. In the inner and brighter bow, called the *primary,* the red is on the outside and the violet on the inside of the arch; in the outer and dimmer one, the *secondary,* the violet is on the outside and the red on the inside. The difference in brightness and the reverse of colors is caused by the various ways in which the drops reflect and refract the rays of light, as shown in the figure.

RAIN GAUGE, *gaje,* an instrument for measuring the depth of rainfall at any one time. The rain gauge in use by the United States Weather Bureau has two cylinders, one within the other. The inner cylinder, *B,* is attached to a funnel-shaped receiver, *C,* whose area is ten times the area of the cylin-

der. A small opening at *D* allows the water to flow into the outer cylinder, *A*, should the amount of rain more than fill the small cylinder. The instrument is accompanied by a rule, graduated in tenths of inches. A rainfall of one inch will give a depth of ten inches in *B*. Whenever the rainfall more than fills *B*, the water in the small cylinder is measured first, and recorded. Then this is poured upon the ground and the water in *A* is poured into *B* and measured. The rainfall is one-tenth the number of inches in the two measures. The rain gauge should be so placed that it will be away from trees, buildings or other high objects so that the rain falling upon it will be neither more nor less than that falling upon an equal area in any part of the locality.



UNITED STATES RAIN GAUGE

RAINIER, *ra neer',* MOUNT, a mountain of volcanic origin, whose peak, 14,408 feet above sea level, is one of the highest in the United States. It is in Mount Rainier National Park, Washington. At the foot of the mountain is Nisqually Glacier, which forms part of one of the most extensive glacier systems in the world. The mountain is visited by thousands of tourists every year.

RAINY LAKE, a body of water forming part of the boundary between Minnesota and Ontario. It is about fifty miles long and of varying breadth. It receives the waters of numerous small lakes from the east and northeast, and discharges through Rainy River, about 100 miles long, into the Lake of the Woods.

RAISIN, RIVER, MASSACRE OF, a massacre committed during the War of 1812 at Frenchtown (now Monroe), Mich. General Winchester, under orders from General Harrison, took up a position on the Maumee River, and sent a detachment of Kentucky troops to drive the British from Frenchtown. After the successful attack he advanced into the village with his whole force. There he was surprised by a British and Indian force of 1,500 under Proctor, and he was forced to surrender. The British then withdrew to Fort Malden, taking with them the able-bodied prisoners and leaving the sick and wounded, to whom the Indians promised protection. Immediately after their departure the Indians fell upon those who were left behind, killing nearly four hundred. The cry, "Remember the River Raisin," was throughout the rest of the war a battle-cry to inspire among American troops feats of daring and revenge.

RAISINS, *ra'z'nz,* grapes containing a large amount of sugar, dried by natural heat. The natural and best method is by cutting the stalks half through when the fruit is ripe, allowing the finest grapes to shrink and dry on the vine by the heat of the sun. Another method consists of plucking the grapes from the stalks, drying and dipping them in a boiling lye of wood ashes and quicklime, after which they are exposed to the sun upon hurdles of basket work. Those dried by the first method are called raisins of the sun, or *sun-raisins, muscatels,* or *blooms;* those by the second, *lexias.* After drying, the raisins are stored in bins called "sweat boxes" until sorted, weighed and packed for shipping. The inferior sorts of grapes are dried in ovens.

Raisins are produced in large quantities in Southern Europe, in Egypt, in Asia Minor and in California. The finest table and cluster raisins come from Spain. A variety without seeds, from Turkey, is known as *sultanas.* The *Corinthian raisin,* or currant, is obtained from a small variety of grape peculiar to the Greek islands. See GRAPE.

RAJAH, *rah'jah,* in India, originally, a title which belonged to those princes of the Hindu race who, either as independent rulers or as feudal vassals, governed a territory; subsequently the title was bestowed by the native governments, and in later times it was given by the British government to Hindus of high rank. It is now not unfrequently assumed by the *zemindars,* or landholders, the title *maharajah* (great rajah) being in our day generally reserved to the more or less powerful native princes.

RAJPUTANA, *rahj poo tah'nah,* known officially as RAJPUTANA AGENCY, is a territory in India. It consists of twenty-one native states surrounding the British province of Ajmer-Merwara, and is situated in the

western part of the country, south of the Punjab and west of the United Provinces of Agra and Oudh. The area is 128,987 square miles; in 1911 the population was 10,530,432. Most of the people are Hindus, but there are nearly a million Mohammedans.

Rajputana is intersected by the Aravalli Mountains, to the north of which the country is desert. The soil is remarkably saline, containing many salt springs and salt lakes, and much of the well water is brackish. To the south of the range the country is more fertile. The chief industry of the country is agriculture, and cereals and cottons are grown. The water supply is very uncertain, however, and famines are not infrequent. The government is administered by local officials who are responsible to the British government.

RALEIGH, *raw'ly*, N. C., the capital of the state and the county seat of Wake County, 148 miles northwest of Wilmington, on the Southern, the Seaboard Air Line and the Norfolk Southern railroads. The city is situated on an elevation of over 300 feet, in the upper valley of the Neuse River. The state capitol is a granite structure and occupies a prominent site on Union Square, near the center of the city. Other places of interest are the Confederate and National cemeteries, Pullen Park and the large state agricultural experiment farm. The educational institutions include the state college of agricultural and mechanic arts, Baptist University for Women, Peace Institute, Saint Mary's School, Saint Augustine Normal School and Collegiate Institute, and Shaw University. There are large state and supreme court libraries and the Raney Public Library. Some of the charitable institutions are the state asylum for the insane, the state institutions for the deaf, dumb and blind and two orphanages. Other prominent buildings are the governor's mansion, the state penitentiary, the supreme court building, the state geological museum, a Federal building, a fine courthouse and a municipal auditorium.

The city has an extensive trade in cotton, tobacco and general produce and contains a large spinning mill, gingham and other cotton goods factories, underwear and hosiery works, oil mills, fertilizer works, phosphate works, cigar factories, car works and various other industrial establishments. The site of the city was chosen for the capital in 1792, was laid out the same year and was named in honor of Sir Walter Raleigh. The legislature first met here in 1794. The commission form of government was adopted in 1912. Population, 1910, 19,218; in 1917, 20,274 (Federal estimate).

RALEIGH, *raw'li*, WALTER, Sir (about 1552–1618), an English navigator, warrior, statesman and writer, prominent in history chiefly as a courtier of Queen Elizabeth. He studied at Oxford, and at the age of seventeen joined a body of gentlemen volunteers, raised to assist the French Protestants. After this he engaged in buccaneering enterprises and served a year as captain in the Irish service. He then became a favorite at court and received appointments and grants which made him rich; according to tradition, this was because he threw his embroidered cloak into the mud, for Queen Elizabeth to walk over.

SIR WALTER RALEIGH

In 1584 he obtained a charter of colonization and made repeated unsuccessful attempts to colonize Virginia. In the same year he obtained a large share of forfeited Irish estates, and introduced there the cultivation of the potato. In 1588 he rendered excellent service against the Spanish Armada, and subsequently fitted out vessels to attack the Spaniards. He also occupied a seat in Parliament.

To discover the fabled El Dorado, or region of gold, Raleigh planned an expedition to Guiana, on which he embarked in 1595. He reached the Orinoco, but was obliged to return after having done little more than take formal possession of the country in the name of Elizabeth. In 1596 he held a naval command against Spain, under Lord Howard and the Earl of Essex, and he assisted in the defeat of the Spanish fleet and the capture of Cadiz.

James I, on his accession in 1603, was prejudiced against Raleigh, whom he deprived of all his offices. Accused of complicity in Lord Cobham's treason against James, Raleigh was brought to trial in November, 1603, found guilty and sentenced to death. He was, however, reprieved and confined to the Tower. Here he remained for

twelve years, devoting himself to scientific and literary work and writing his *History of the World,* one of the most noteworthy contributions to Elizabethan literature. He also wrote philosophical and religious treatises. In 1616 he obtained his release by offering to open a mine of gold which he believed to exist near the Orinoco. The enterprise proved disastrous. Raleigh's force had attacked the Spaniards, and on his return James, to favor the Spanish court, determined to execute him on his former sentence. After a trial before a commission of the privy council, he was put to death.

RAMAYANA, *ra mah'yah nah,* an epic poem of India, written almost entirely by Valmiki, a poet who lived at the beginning of the Christian Era. The poem, one of the world's greatest epics, recounts the story of Prince Rama's successful combat with the king of demons, who dwelt in Lanka (probably Ceylon).

RAMEE, *ra may',* LOUISA DE LA (1840–1908), an English novelist, better known under her pen name, OUIDA, the name by which she called herself as a small child in attempting to pronounce "Louisa." While her novels are cheaply sentimental and sensational, her children's stories, of which the best is *The Nüremberg Stove,* are well worth reading. *Under Two Flags, A Dog of Flanders, Two Little Wooden Shoes* and *Bimbi* are among the stories that brought this author a considerable fortune.

RAMESES II, *ram'e seez,* (reigned from about 1340 to 1273 B. C.), was the most powerful of the twelve Egyptian kings called Rameses. He was very young when he came to the throne, and in the early part of his reign conquered Ethiopia and overthrew a confederacy of which the Hittites were head. At twenty-one he formed an alliance with the Hittites and married a daughter of their king. The latter part of his reign, which extended over sixty-seven years, was peaceful. Rameses erected many temples and several colossal statues of himself; his tomb at Ipsambul is one of the show places of Egypt. The mummy of the king, found in 1881, near Thebes, is in the museum at Cairo.

RA'MIE. See BOEHMERIA.

RANDOLPH, *ran'dolf,* EDMUND JENNINGS (1753–1813), an American statesman, born in Williamsburg, Va., and educated at William and Mary College. He identified himself with the patriot party, served for a time on Washington's staff and in various political capacities in his native state, was a member of the Continental Congress in 1780 and became governor of Virginia in 1786. He was a conspicuous member of the Constitutional Convention and favored a strong central government, was opposed to numerous provisions of the Constitution and refused to sign it, but later advocated its ratification in Virginia. In 1789 he became first Attorney-General of the United States, and five years later he succeeded Jefferson as Secretary of State, but resigned in August, 1795, owing to political charges—later shown to be false—involving his honor. He was one of the foremost lawyers of his time and a brilliant orator and writer.

RANDOLPH, JOHN, "of Roanoke" (1773–1833), an American statesman, a native of Virginia and a direct descendant of Pocahontas. He was educated at Princeton and Columbia colleges and, after a brief period of law practice, was elected to Congress in 1799. In public life he was distinguished for eloquence, wit, invective and eccentricity. For thirty years he was more prominent than any other American politician. He was the Democratic leader of the House of Representatives, but quarreled with Jefferson and opposed the War of 1812; he opposed also the Missouri Compromise and stigmatized its Northern supporters as "Doughfaces." He opposed Jackson on the nullification question. From 1825 to 1827 he sat in the Senate. While in the Senate Randolph characterized the coalition between Clay and Adams as a union of "the blackleg and the Puritan," and the result was a harmless duel with Clay. In 1830 he was appointed minister to Russia. By his will he freed his numerous slaves and provided for their settlement in a free colony.

JOHN RANDOLPH

RANGOON', BURMA, the capital and chief seaport of the province, is situated on the Rangoon River, about twenty-five miles from the sea. Since its occupancy by the British in 1852, Rangoon has undergone such changes

that it is practically a new town, and its population has increased fivefold. The principal streets are broad and contain many large buildings and not a few handsome ones. There are the law courts, the postoffices, the Bank of Bengal, the customhouse, the Anglican and Roman Catholic churches, Rangoon College and other buildings. A large and increasing commerce is carried on with British, Indian and Chinese ports; and an extensive trade is conducted with inland towns, as far as Mandalay. The chief exports are rice and teak, and the imports are mainly manufactured goods. A number of modern rice mills have been erected, and Rangoon is probably the greatest rice market in the world. There is a government dockyard. Population, 1911, 293,316.

RANK, the degree of authority and dignity attached to the various officers of the army and navy. The commander in chief is usually the executive head of the nation and commands the entire national force. In the United States the President holds the title under the Constitution, but he exerts his power through his secretaries of war and navy. The general officers of the army commanding bodies larger than a regiment are, in order of rank, the lieutenant-general, who commands an army corps of a field army; a major-general, who commands a division, and a brigadier-general, who commands a brigade. At times the title of general is sometimes used to designate the military authority second only to that of the President. A regiment is commanded by a colonel aided by a lieutenant-colonel; a battalion by a major; a company by a captain, assisted by a first and a second lieutenant. Below the second lieutenant the officers are known as non-commissioned, or warrant, officers, and these are sergeants and corporals. They are appointed by the senior officer in command, and hold their positions at his pleasure.

Under the Secretary of the Navy, the highest grades are those of admiral and rear-admiral. A vice-admiral, when such a title is given, ranks second only to an admiral. Other commissioned officers are the captains of ships, commanders, lieutenant-commanders, lieutenants, ensigns and midshipmen. The last two are graduates of the Naval Academy, not yet fully commissioned. The rank of commodore was abolished in 1905. The corresponding ranks in the army and navy are as follows:

Army	Navy
General	Admiral.
Lieutenant-General	Vice-Admiral.
Major-General	Rear-Admiral.
Brigadier-General	*Commodore.
Colonel	Captain.
Lieutenant-Colonel	Commander.
Major	Lieutenant-Commander.
Captain	Lieutenant.
First-Lieutenant	Lieutenant. (junior grade).
Second-Lieutenant	Ensign.

*Not now commissioned.

RANKE, *rahn'ke*, Leopold von (1795–1886), an eminent German historian, one of the founders of the modern historical school, which depends for its facts upon scientific investigation rather than on tradition. He studied in the University of Leipzig, became a teacher in the gymnasium of Frankfort-on-the Oder in 1818, and in 1825 accepted a professorship at the University of Berlin, where he remained until 1871. His first published work was a *History of the Romance and Teutonic Nations from 1494 to 1535*. This was followed by *Princes and Peoples of Southern Europe in the Sixteenth and Seventeenth Centuries; History of the Popes; History of Germany in the Time of the Reformation; History of France, Chiefly in the Sixteenth and Seventeenth Centuries; History of England in the Seventeenth Century,* besides a number of other works. At the age of eighty he undertook with undiminished vigor to write a history of the world, and a volume of this great work appeared every year until his death. Ranke's style, though clear and easy to read, is dull and unentertaining.

RANKIN, Jeannette, (1880–), the first woman ever elected to the United States Congress. She was a member of the 65th Congress (1917–1919), the Republican representative-at-large for Montana, in the main a Democratic state. Her election from a state counting three men to every woman was considered not only a triumphant victory for the woman's suffrage cause but was a personal tribute to her from men who endorsed her beliefs respecting labor.

Miss Rankin was born on a ranch near Missoula, Mont., was graduated from the University of Montana in 1902, and has since been identified with social and suffrage work in almost every state in the Union. In New Zealand she worked as a seamstress to study personally social and economic conditions there. She directed the campaign

THE SISTINE MADONNA — *Raphael*
Dresden, Germany

which gave suffrage to the women of Montana in 1914. In 1919 she was one of the American delegates to the women's international conference which met in Europe to consider the peace treaty and other questions connected with the World War.

RANUN'CULUS, the typical genus of the buttercup family. It includes hellebore, aconite, larkspur, anemone, columbine, peony, marsh marigold, clematis and numerous other familiar forms. These herbs, some annual, some perennials, are widely distributed throughout the temperate zones of both hemispheres. Some of them, being poisonous, are shunned by grazing animals and have multiplied rapidly. The commonest of the wild species in the meadows of the United States are *crowfoot, buttercup* and *spearwort.*

RAPHAEL SANTI, *rah'fa el sahn'te,* (1483–1520), one of the greatest painters that ever lived, often spoken of as the "Divine Raphael," was born at Urbino, Italy. His father was Giovanni Sanzio, a painter of some merit, from whom young Raphael received his first instruction. At the early age of twelve, he was received into the studio of Perugino at Perugia, as one of his pupils, and he continued with that celebrated painter for six or eight years. In 1504, after a period of study and work at Perugia, he visited his native town, and while there painted *Christ Praying on the Mount of Olives,* a *Saint Michael* and a *Saint George;* the last two are now in the Louvre. At about the same time he executed the *Marriage of the Virgin* (now in Milan) and several Madonnas, one of which is in the Metropolitan Museum, New York. Toward the end of the same year he proceeded to Florence, attracted thither by the fame of its numerous artists, and in this center of the highest artistic life of the time he studied diligently for a period of four years. In Florence he rapidly gained a wider knowledge of his art. He was profoundly influenced by the great painters there and by the sculptors Donatello and Ghiberti. In the course of his last two years in Florence he executed some of his best known paintings, among them *The Entombment of Christ,* the *Madonna of the Grand Duke, Christ Bearing the Cross* and *The Marriage of the Virgin.*

RAPHAEL

In 1508 Raphael went to Rome, at the invitation of Pope Julius II, and began his work on the frescoes of the Vatican. After the accession of Pope Leo X, Raphael became the chief architect of Saint Peter's. At this time he also prepared designs for several palaces in Rome and other cities of Italy and finished the *Sistine Madonna,* the most celebrated picture in the world, for the Church of Saint Sixtus, Piacenza. It is now in the gallery at Dresden. To this period also belong his easel pieces, *Saint John in the Desert* and *Saint Cecilia,* and the circular composition known as the *Madonna of the Chair.* Raphael's last, and unfinished, painting, *The Transfiguration of Christ,* is in the Vatican.

Raphael has been called, and perhaps justly, the greatest of all religious painters. He combined sweetness with strength, grace and elegance with profound spiritual feeling, and his technical skill has never been surpassed. See MADONNA.

RAPPAHANNOCK, *rap a han'ok,* a river in Virginia, which rises in the Blue Ridge, flows southeast for 250 miles and enters Chesapeake Bay. It is navigable to Fredericksburg, 100 miles from its mouth. Here there is a fall which furnishes power for the operation of factories. The largest tributary is the Rapidan.

RASPBERRY, *raz'ber ry,* the fruit of a well-known shrubby plant, which is of the same genus as the blackberry. Several species are found growing wild in America and in Northern Europe and Asia. In the United States the common *red raspberry* is very abundant, especially in the Northern states. It is a delicious fruit, but is not easily marketed, because it is so easily crushed and spoiled.

Strictly speaking, the raspberry is a tiny cap, a collection of cells each centered with a tiny seed, grouped around a receptacle, from which they part easily when the fruit is ripe. The three most familiar varieties are the European red raspberry and the native black and red raspberry. The black raspberry is smaller and less juicy than the red, but is finer in flavor. Both varieties are canned and cooked as jam. The raspberry crop in the United States is second only to

that of the strawberry, about 80,000,000 quarts being the annual output.

RAT, a common rodent mammal, a pest to mankind. The two most common species are the *Norway,* or *brown rat,* and the *black rat.* The brown rat, the larger and stronger, grows to about nine inches in length and is of a brownish color above and white below. Supposed to have been native to India and China, it became known in Europe about the middle of the eighteenth century; but it is now found in almost every part of the habitable globe. It is a voracious animal, swims readily in water and breeds four or five times in the year, each brood numbering about a dozen. The black rat is usually about seven inches in length, has a sharper head, larger ears and a much longer tail than the brown rat. It is also much less numerous and more timid. As rats are carriers of the bubonic plague (see PLAGUE), constant warfare is waged for their extermination, especially in the western ports of America, where vessels from Oriental countries are anchored.

RATCH'ET, a mechanism which limits the rotation of a wheel to one direction. It consists of a piece of metal, one end of which is attached to a pivot, the other so shaped and placed as to fit into the teeth of a wheel and prevent a backward motion. A *ratchet wheel* is a toothed wheel such as that which moves the carriage of a typewriter.

RA'TEL, a carnivorous animal of the badger family, found chiefly in the southern and eastern parts of Africa and in India. Its hair, unlike that of most animals, is light above and dark underneath. The *Cape,* or

RATEL

South African, ratel averages about three feet in length, including the tail. The fur is thick and coarse, black on the under parts, grayish on tail, upper surface, sides and neck. Ratels frequently raid the hives of wild bees and eat the honey, and because of this trick they are sometimes called *honey badgers.*

RATIO, *ra'she o,* or *ra'sho,* the numerical relation which two quantities of the same kind bear to each other. It is expressed as the quotient obtained by dividing one quantity by the other. For example, 8 stands in the same relation to 16 as 2 to 4, and the ratio of the two groups, although they vary in quantity, is the same. See PROPORTION.

RATTAN', a large group of tropical palms, found chiefly in Borneo, where the most valuable are produced, also in Sumatra, Burma,

RATTAN

Malaysia and Ceylon. The long, slender, jointed stems are strong, flexible and durable and have a high commercial value. They are exported in large quantities to Europe and America, where they are used in the manufacture of furniture, baskets, umbrella handles and other articles. The fruit and the young shoots of some species are used by natives as food. See PALM; CANE.

RAT'TLESNAKE, the name of various poisonous American snakes, distinguished from the other members of the family by a series of horny rings at the end of the tail, which the animal shakes in such a manner as to make a rattling sound. The rattlesnake is one of the most deadly of poisonous serpents. A number of species belong to the United States and Mexico. East of the Mississippi the *banded rattlesnake* is the best-known and most dreaded species. It is naturally a sluggish animal, ready to defend itself, but seldom commencing the attack. It feeds on rats, squirrels and small rabbits and reaches a length of five or six feet. The *striped rattlesnake* is found from Mexico to

Brazil; the *diamond rattlesnake,* sometimes eight feet long, greenish or golden-brown, marked on the back with diamond-shaped spots, is found in the swamps of the Southern states. The *Western black rattlesnake,* the *prairie rattlesnake,* the *horned rattlesnake* and various other species are scattered throughout the country. The venom in a rattlesnake's bite seems to vary with the season and with the individual attacked. Hogs and peccaries, which are rendered immune by their thick hides and layers of fat, are not afraid of the reptiles, and often kill and eat them. The snakes feed on field mice and other small animals. See SNAKE.

RATTLESNAKE

RA'VEN, a large bird of the crow family, whose plumage, beak and legs are jet black. Its remarkable appearance has in times past made the bird an object of veneration, awe or superstition, and it has figured conspicuously in literature. In Poe's poem, *The Raven,* the

RAVEN

bird, with its repeated utterance of the doleful word "nevermore," is symbolic of the utmost depression and melancholy. According to *Genesis,* Noah from the Ark sent out a raven—the first bird mentioned in the Bible. Many stories have been related of the bird's cleverness. Pliny told of a thirsty raven that raised water in a jug by dropping stones into it.

Ravens are found in every continent. Some adults have been known to attain a length of twenty-six inches. They live in pairs and are said to mate for life—the average length of which is equal to man's. In early spring the rough nest is built, usually on a high cliff, and four or five greenish eggs, speckled with brown and black, are laid. Ravens are sometimes domesticated, because they can be taught, like the crows, to talk.

RAY, a large group of fishes, including the saw fish, devil fish, skate, string ray, shark ray and electric ray. Many members of the group are characterized by extreme flatness of the body and by winglike extensions on the sides. The rays are found in all seas, and more than a hundred species are known. Some of the individuals measure ten feet in length. See SKATE.

RA'ZOR, a tool used for shaving off the beard or hair. Razors are made of the best quality of steel and usually have thin blades, with concave sides. The back is thick, and the blade is fastened to the handle by a rivet, upon which it turns. When closed, the handle protects the edge of the blade. The safety razor has a guard which prevents cutting the face. The best razors were for many years made in Sheffield, England and in Germany; America now produces razor steel equal to the best European quality.

REACTION, *re ak'shun,* in chemistry, the name given to the changes that occur when two or more substances mixed together so act upon each other as to produce a new substance different from any of the substances uniting to form it. For instance, the oxygen of the air combines with wood or coal to form water, carbon dioxide and some other substances, leaving ash in the place of the wood or coal. When the process is rapid sufficient heat is produced to ignite the wood and cause fire. If oxygen and hydrogen are mixed in proper proportions in a closed vessel and ignited, they combine and form water. In chemistry reactions are expressed in the form of equations, as $2H+O=H_2O$, which means that two atoms of hydrogen are combined with one atom of oxygen to form a molecule of water. It will be noticed that the same number of atoms appears in each member of the equation. The study of chemistry is chiefly the study of reactions. See CHEMISTRY.

READ, *reed,* OPIE PERCIVAL (1852–), an American novelist and humorist. He was born at Nashville, Tenn., and after a brief school course began newspaper reporting at Franklin, Ky. Later he did newspaper work

in Ohio and Arkansas, and founded the humorous journal, *The Arkansas Traveler.* In 1891 he settled in Chicago. A list of his novels includes *Len Gansett, A Kentucky Colonel, A Tennessee Judge, A Yankee from the West* and *Old Ebenezer.*

READ, THOMAS BUCHANAN (1822–1872), an American painter and poet, born in Chester County, Pa. After a youth spent on his father's farm he went to Boston, and there, when he was about twenty, his verses began to appear in newspapers. In 1850 he went to Rome, where he studied art. He is best known for his stirring poem *Sheridan's Ride,* and for his verses entitled *Drifting.* Among his works are *Poems, Lays and Ballads, The New Pastoral* and *The House by the Sea.* His compilation *Female Poets of America* is illustrated with reproductions of portraits he painted.

READE, CHARLES (1814–1884), an English novelist and playwright. He was educated at Magdalen College, Oxford, and became dean of arts there. He studied law and for a time practiced in London. His first novel, *Peg Woffington,* was expanded from the play *Masks and Faces,* written in conjunction with Tom Taylor. This was followed by *Christie Johnstone* and *Never Too Late to Mend,* one of his "novels with a purpose," in which he attacked the English prison system. *Hard Cash* deals with the abuses practiced in insane asylums, and *Put Yourself in His Place* is an attack on the abuses of trade unionism. The best of his novels, *The Cloister and the Hearth,* has for its chief characters the parents of Erasmus. Reade, while not one of the greatest English novelists, is always entertaining.

READING. When a child has learned to read, he has come into possession of the key to all knowledge. The extent of his later reading and its quality determine to a considerable degree what manner of man he is to be.

The reading habit is instinctive; the minds of the boy and girl naturally reach out toward the unknown for facts which may be made their own and made to serve some purpose in their lives. Some like to read much better than do others; and this is due to more than one reason. The illiterate boy and the one with low ideals may have had no home encouragement in the direction of good literature and possibly even may have been discouraged in seeking it. His ideal is likely to be the town bully, and his literature the lurid pages of the nickel novel. Let no one believe that such a boy reads nothing; the instinct for something from the printed page which he can unite to his own experience is alive in him as in the boy of other caliber.

Choice of Good Reading. Every boy and girl has a hero or a heroine—possibly many—and these are determined largely by their choice of reading. If one chooses the stories of King Arthur in early boyhood and reads them with pleasure, the lessons are going to be reflected in later years. It does no harm for the youthful mind to dwell upon the stirring plot of Jack the Giant Killer, for there is a high moral lesson which is sure to be learned and later remembered above the gory elements of the tale itself. Every intelligent parent knows the importance and difficulty, in these days of rapidly multiplying books and sensational newspapers, of making a wise selection of reading for the child in the home. It can be set down as almost an axiom that the boy and the girl for whom good books are provided will not of their own volition seek the worse books for themselves. The following books are suggested as worthwhile reading. Those of the first group are adapted to young people of the high school age and adults. Books for children are included in the second group.

Books for Young People and Adults. *Fiction. The Last of the Mohicans, The Spy* and *The Pilot,* by James Fenimore Cooper; *Uncle Tom's Cabin,* Harriet Beecher Stowe; *The Scarlet Letter* and *The House of the Seven Gables,* Nathaniel Hawthorne; *Lorna Doone,* R. D. Blackmore; *Last Days of Pompeii,* Bulwer-Lytton; *A Daughter of Heth,* William Black; *The Rise of Silas Lapham,* W. D. Howells; *Hypatia,* Charles Kingsley; *Ivanhoe* and *The Heart of Midlothian,* Sir Walter Scott; *Romola,* George Eliot; *Oliver Twist* and *David Copperfield,* Charles Dickens; *The Vicar of Wakefield,* Oliver Goldsmith; *Henry Esmond* and *Vanity Fair,* William M. Thackeray.

Narrative Poems. Evangeline and *The Courtship of Miles Standish,* by Henry W. Longfellow; *Lars,* Bayard Taylor; *Enoch Arden,* Alfred Tennyson; *Snowbound,* John G. Whittier; *Marmion* and *Lady of the Lake,* Sir Walter Scott; *The Knightes Tale,* Geoffrey Chaucer; *Paradise Lost,* John Milton.

Essays. Dream Children and *Dissertation upon Roast Pig,* by Charles Lamb; *Sir Roger*

de Coverley Papers from *The Spectator,* Joseph Addison; *My Study Fire,* Hamilton W. Mabie; *Birds and Bees* and *Wake Robin,* John Burroughs; *Dream Days,* Kenneth Grahame; *Essays in Idleness,* Agnes Repplier; *My Study Windows,* James Russell Lowell; *Virginibus Puerisque,* Robert Louis Stevenson; *The Autocrat of the Breakfast Table,* Oliver Wendell Holmes; *Crown of Wild Olives,* John Ruskin; *Self Reliance, Compensation* and *The American Scholar,* Ralph Waldo Emerson; *John Milton, Joseph Addison* and *Warren Hastings,* Thomas Babington Macaulay; *Of Nature in Men* and *Of Studies,* Sir Francis Bacon.

Lyric Poetry. (1) Miscellaneous Lyrics: *The Rainy Day,* by Henry W. Longfellow; *To a Waterfowl* and *The Wind and the Stream,* William Cullen Bryant; *To a Daisy* and *The Daffodils,* William Wordsworth; *To a Mouse, For a' That and a' That* and *Auld Lang Syne,* Robert Burns; *The Chambered Nautilus,* Oliver Wendell Holmes; *The Destruction of Sennacherib,* George Gordon Byron; *An Old Played-out Song,* James Whitcomb Riley; *Ode to a Skylark,* Percy Bysshe Shelley; *To a Dandelion,* James Russell Lowell; *Annabel Lee,* Edgar Allan Poe; *L'Allegro* and *Il Penseroso,* John Milton. (2) Elegies: *Elegy in a Country Churchyard,* Thomas Gray; *Threnodia,* James Russell Lowell; *In Memoriam,* Alfred Tennyson; *Lycidas,* John Milton; *Adonais,* Percy Bysshe Shelley. (3) Sonnets: *Victor and Vanquished* and *The Two Rivers,* Henry W. Longfellow; *On His Own Blindness,* John Milton; *Night,* Alfred Tennyson; *Reading,* James Russell Lowell; *When She Comes Home,* James Whitcomb Riley; *Composed on Westminster Bridge,* William Wordsworth.

Dramas. She Stoops to Conquer, by Oliver Goldsmith; *The Rivals,* Richard Brinsley Sheridan; *Richelieu,* Bulwer-Lytton; *Macbeth, Hamlet, Romeo and Juliet, The Tempest, Much Ado about Nothing, Comedy of Errors, Julius Caesar, Richard III* and *King Lear,* William Shakespeare.

Such a list cannot be considered as complete, but it is really suggestive. No one can read the works mentioned here without having brought to his attention a number of other masterpieces in each group. If, in reading, a person becomes interested in the works of any writer, his reading should not be limited to the titles suggested here, but should be pursued as long as it seems pleasing and profitable and as time permits. In so reading, other writers will come into view, whose works deserve and should receive attention. The course of reading suggested, then, might be considered as a series of starting points for more extended reading.

Other departments of literature furnish different styles of reading which many will follow with interest and profit. Among the famous orations, for instance, are *The Scholar in a Republic* and *The Lost Arts,* by Wendell Phillips; *Reply to Hayne,* Daniel Webster; *On Conciliation with America,* Edmund Burke. Many of the great histories and biographies are real literature and may be read with the same genuine pleasure that fiction gives. Among the biographies should be included Franklin's *Autobiography; Life of Charlotte Brontë,* by Gaskell; *The Early History of Charles James Fox,* by Trevelyan; *La Salle,* by Parkman. *The Rise of the Dutch Republic,* by Motley, and *The Conquest of Mexico,* by Prescott are types of the finest literary history.

If a person should desire to undertake a rather wide range of reading, in chronological order, he may get a comprehensive knowledge of English and American literature in its different epochs by reading the following books, in the order given:

English. The Prologue of the *Canterbury Tales* and *The Knightes Tale,* Geoffrey Chaucer; the ballads of *Chevy Chase* and of *Robin Hood; Of Nature in Men, Of Expense, Of Studies* and other essays, Sir Francis Bacon; the first and third cantos of *The Faerie Queene,* Edmund Spenser; *Hamlet, Julius Caesar, Twelfth Night, The Tempest* and *Richard III,* William Shakespeare; *L'Allegro, Il Penseroso* and *Paradise Lost,* John Milton; *Robinson Crusoe,* Daniel Defoe; *Gulliver's Travels,* Dean Swift; *The Spectator,* Joseph Addison; *Essay on Man,* Alexander Pope; *On Conciliation with America,* Edmund Burke; *Clarissa Harlowe,* Samuel Richardson; *Tom Jones,* Henry Fielding; *Roderick Random,* Tobias Smollett; *Tristram Shandy,* Laurence Sterne; *She Stoops to Conquer, The Deserted Village* and *Vicar of Wakefield,* Oliver Goldsmith; *The Ancient Mariner,* Samuel Taylor Coleridge; *Tales from Shakespeare* and *Essays,* Charles Lamb; *The Lay of the Last Minstrel, Lady of the Lake, Ivanhoe, Heart of Midlothian, The Talisman* and *Old Mortality,* Sir Walter Scott; *The Dream, The Prisoner of Chillon,*

Destruction of Sennacherib and *Childe Harold,* George Gordon Byron; *Ode to the Skylark, The Cloud* and *Adonais,* Percy Bysshe Shelley; *Ode on a Grecian Urn* and *Ode to Autumn,* John Keats; *To a Daisy, The Solitary Reaper, The Daffodils, She Was a Phantom of Delight* and *Bereavement,* William Wordsworth; *Auld Lang Syne, Flow Gently Sweet Afton, Highland Mary, To Mary in Heaven* and *The Cotter's Saturday Night,* Robert Burns; *How Horatius Kept the Bridge, John Milton* and *Joseph Addison,* Thomas Babington Macaulay; *Heroes and Hero Worship,* Thomas Carlyle; *Sohrab and Rustum* and *Essays in Criticism,* Matthew Arnold; *Pendennis, Henry Esmond* and *Vanity Fair,* William M. Thackeray; *Adam Bede, Romola* and *Silas Marner,* George Eliot; *Last Days of Pompeii,* Bulwer-Lytton; *In Memoriam,* Alfred Tennyson; *Pippa Passes,* Robert Browning.

American. A chronological view of American literature should include the reading of such works as the following:

The Last of the Mohicans, The Pilot and *The Spy,* James Fenimore Cooper; *Thanatopsis* and *To a Waterfowl,* William Cullen Bryant; *The Sketch Book, Knickerbocker History of New York* and *The Alhambra,* Washington Irving; *The Raven, Annabel Lee, The Gold Bug* and *The Murders in the Rue Morgue,* Edgar Allan Poe; *The Scarlet Letter* and *The House of the Seven Gables,* Nathaniel Hawthorne; *Self Reliance, Compensation* and *The American Scholar,* Ralph Waldo Emerson; *Wild Apples, Walden* and *A Week on the Concord and Merrimac Rivers,* Henry D. Thoreau; *Uncle Tom's Cabin* and *Oldtown Folks,* Harriet Beecher Stowe; *Snowbound,* John G. Whittier; *The Psalm of Life, The Reaper and the Flowers, Resignation, The Courtship of Miles Standish, Evangeline* and *Hiawatha,* Henry W. Longfellow; *The Chambered Nautilus, Old Ironsides, The Deacon's Masterpiece, The Guardian Angel* and *The Autocrat of the Breakfast Table,* Oliver Wendell Holmes; *She Came and Went, The First Snowfall, Two Angels, The Vision of Sir Launfal, Biglow Papers* and *My Study Windows,* James Russell Lowell. No mention is made of recent writers or of current literature. The magazines and public press will keep one informed as to these.

Reading for Children. In city schools the course of study is well established and the reading matter for every grade is carefully selected, so that teachers cannot well go astray. In the smaller graded schools and, in fact, in the district schools, the character and quantity of reading in each grade or class can easily be determined from courses of study or by following any one of the many excellent sets of modern readers. In most schools, too, more or less reading matter supplementary to the general course is available, and usually teachers have only to ask for more, in order to obtain it. The following list of supplementary works is intentionally brief, but yet it shows a course of reading which might be followed with profit in almost any school where no specific plans have been made for supplementary work.

If the teacher finds that a book is not adapted to being read aloud or is too simple or too difficult for the pupils for whom it was assigned, then she has only to go above or below in the list till she finds a book which is adapted to the individual. A child will enjoy listening to books which he cannot read to his own satisfaction until a year or more later. Moreover, children will listen time and again to the stories they like best and seemingly get more and more enjoyment out of them at each reading; so, it is not always necessary to have a great number of books for any grade, if the few that are on hand suit the tastes of the readers. The following list should be helpful to parents, also, in selecting the reading for their children, whose rank in school they know or may easily learn. None of the books mentioned are expensive, and most of them may be obtained in cheap form from the school-book publishing houses.

Primary Schools. A Hiawatha Primer, Holbrook; *Classic Stories for Little Ones,* McMurry; *Stories of the Red Children,* Brooks; *Jingle Book,* Wells; *When Life is Young,* Dodge; *Fables and Folk Stories,* Scudder; *Counterpane-Fairy,* Pyle; *The Birds' Christmas Carol,* Wiggins; *Hans Andersen's Stories; Little Lame Prince,* Craik; *King of the Golden River,* Ruskin; *Wonder Book,* Hawthorne; *Fifty Famous Stories Retold,* Baldwin; *Stories of Indian Children,* Husted; *Ten Boys Who Lived on the Road from Long Ago to Now* and *Seven Little Sisters,* Andrews.

Intermediate Schools. Alice's Adventures in Wonderland, Carroll; *Tanglewood Tales,*

Hawthorne; *Hiawatha,* Longfellow; *Black Beauty,* Sewell; *Captain January,* Richards; *Child Life in Poetry,* Whittier; *Chuck Purdy,* Stoddard; *Five Litle Peppers and How They Grew,* Sidney; *Hans Brinker,* Dodge; *Courtship of Miles Standish,* Longfellow; *A Christmas Carol,* Dickens; *Enoch Arden,* Tennyson; *Birds and Bees,* Burroughs; *Jungle Book,* Kipling; *Story of a Bad Boy,* Aldrich; *Toby Tyler,* Otis; *Widow O'Callahan's Boys,* Zollinger; *Boys of '76,* Coffin; *Story of the Greeks,* Guerber; *First Book of Birds,* Miller; *Little Brothers of the Air,* Miller; *Lobo, Rag and Vixen,* Thompson.

Grammar Schools. Rip Van Winkle, Irving; *Snowbound,* Whittier; *Grandmother's Story of Bunker Hill,* Holmes; *The Deerslayer, The Pilot* and *The Last of the Mohicans,* Cooper; *Tom Brown's School Days,* Hughes; *Timothy's Quest,* Wiggin; *Little Book of Profitable Tales,* Eugene Field; *Vision of Sir Launfal,* Lowell; *Merchant of Venice, Julius Caesar* and *Macbeth,* Shakespeare; *Lady of the Lake* and *Ivanhoe,* Scott; *Hugh Wynne,* Mitchell; *Man Without a Country,* Hale; *Men of Iron,* Pyle; *Prince and Pauper,* Twain; *Stories from Homer,* Church; *Story of Siegfried,* Baldwin; Franklin's *Autobiography; George Washington,* Scudder; *Child Life in Colonial Days,* Earle; *War of Independence,* Fiske; *Boy Travelers in Southern Europe,* Knox; *American Citizen,* Dole; *Among the Law Makers,* Alton; *Biography of a Grizzly,* Thompson; *In Nesting Time,* Miller; *Pepacton,* Burroughs; *Wild Neighbors,* Ingersoll; *A-Hunting of the Deer and Other Essays,* Warner.

Study of Authors. The following suggestions for study will be helpful to teachers and parents who are endeavoring to cultivate in the young people under their charge good literary tastes.

Henry Wadsworth Longfellow

The poems of Longfellow are possibly more generally studied than are those of any other writer. He addressed himself in many of his poems particularly to children and achieved the name of the "Children's Poet."

Biograph. The following outline for the study of the life of Longfellow is offered as a model which can be used in studying the biography of any other writer. Its arrangement is such that it can be adapted to any changed conditions and can be studied by sections. Not all of the outlines below should be offered to younger pupils; the teacher or parent must exercise proper judgment in determining to what extent the smaller boys and girls should be introduced to biography.

I. **Early Life**
  1. Boyhood and youth
     (See "My Lost Youth," also "Prelude" to "Voices of the Night")
  2. Education
     Portland Academy
     Bowdoin College
     Classmates
     Poems

II. **Professor in Bowdoin**
  1. Attempt to study law
  2. Appointment at Bowdoin
  3. Residence in Europe
  4. College work
  5. Marriage
  6. Second trip to Europe
  7. Death of Mrs. Longfellow

III. **Professor at Harvard**
  1. Residence in the Craigie House
  2. Friendships
     Felton, Cleveland, Sumner and Hawthorne
  3. Work in the university
  4. "Hyperion"
  5. "Voices of the Night"
     "Prelude," "Hymn to the Night," "A Psalm of Life," "The Reaper and the Flowers," "The Light of Stars," "Footsteps of Angels," "Flowers," "The Beleaguered City," and "Midnight Mass for the Dying Year"
  6. Ballads
     "The Skeleton in Armor"
     "The Wreck of the Hesperus"
     "The Village Blacksmith"
     "Excelsior," and others
  7. Poems on slavery
  8. Third trip abroad
  9. Second marriage
  10. "The Spanish Student," and other poems
  11. "Kavanagh"
  12. "The Building of the Ship," and other poems

IV. **Later Life**
  1. Retirement from Harvard
  2. Important poems of this period
     "Evangeline," "The Courtship of Miles Standish," "Hiawatha," "Tales of a Wayside Inn," and "Birds of Passage."
  3. Celebration of Longfellow's seventy-second birthday
     The presentation of the chair
     Whittier's poem, "The Poet and the Children"
     "From my Armchair"
  4. Death, March 25, 1882

V. **Estimates of Longfellow as a Poet**

The Study of Selections. In the study of literature selections, whether of poetry or prose, the teacher should observe the following points:

1. Be sure that the selection is adapted in thought and sentiment to the age and capacity of the class. Inexperienced teachers often make the mistake of using selections too difficult for the pupils.

2. See that the subject is such as will enable the pupils to grasp and enter into the spirit of the selection. (Note directions for the study of "The Village Blacksmith," below.)

3. Be sure that the pupils know the meaning of all words in the selection, and that they understand all the obscure and difficult passages.

4. If necessary, assist the pupils in forming mental pictures of the scenes and objects described.

5. Add such interesting items and information as you can obtain. For instance, pupils are always interested in the history of the selection studied. They like to know how Longfellow came to write "Children," "The Children's Hour," "The Village Blacksmith," and all poems in which they are interested. The teacher who can give information of this sort is always sure to have an interested class.

6. For the purpose of making practical application of our suggestions, we here give plans for the study of the poem "The Village Blacksmith."

THE VILLAGE BLACKSMITH

"The Village Blacksmith" first appeared in a volume of Longfellow's poems entitled "Ballads and Other Poems." The smithy alluded to was on Brattle Street, Cambridge, and was partially over-arched by a large chestnut tree. In his walks, Mr. Longfellow frequently saw the smith at work. Years afterward, the smithy was removed, a dwelling house was erected upon the site, and some of the branches of the tree were lopped off to make room for the house. This gave the tree such an unsightly appearance, that some months later it was ordered to be cut down by the village authorities. Most of the chips were carried away by the people of Cambridge as souvenirs. From the wood of this tree was made the chair which the children of Cambridge presented Mr. Longfellow on his seventy-second birthday.

THE VILLAGE BLACKSMITH

Under a spreading chestnut tree
The village smithy stands;
The smith, a mighty man is he,
With large and sinewy hands;
And the muscles of his brawny arms
Are strong as iron bands.

His hair is crisp, and black, and long,
His face is like the tan;
His brow is wet with honest sweat,
He earns what'er he can,
And looks the whole world in the face,
For he owes not any man.

Week in, week out, from morn till night,
You can hear his bellows blow;
You can hear him swing his heavy sledge,
With measured beat and slow,
Like a sexton ringing the village bell,
When the evening sun is low.

And children coming home from school
Look in at the open door;
They love to see the flaming forge,
And hear the bellows roar,
And catch the burning sparks that fly
Like chaff from a thrashing-floor.

He goes on Sunday to the church,
And sits among his boys;
He hears the parson pray and preach,
He hears his daughter's voice,
Singing in the village choir,
And it makes his heart rejoice.

It sounds to him like her mother's voice,
Singing in Paradise!
He needs must think of her once more,
How in the grave she lies;
And with his hard, rough hand he wipes
A tear out of his eyes.

Toiling, rejoicing, sorrowing,
Onward through life he goes;
Each morning sees some task begun,
Each evening sees it close;
Something attempted, something done,
Has earned a night's repose.

Thanks, thanks to thee, my worthy friend,
For the lesson thou has taught!
Thus at the flaming forge of life
Our fortunes must be wrought;
Thus on its sounding anvil shaped
Each burning deed and thought.

Teacher's Preparation. 1. Make a careful study of the poem before presenting it to the class.

(a) Be sure you can explain by concrete illustrations the meaning of all terms used in the poem.

(b) Separate the poem into parts, having each part contain a unit of thought or representation. There are four such divisions in "The Village Blacksmith."

(1) The smithy and the smith (Stanzas 1–3).

(2) The children at the smithy (Stanza 4).

(3) The smith at church (Stanzas 5–6).

(4) Lessons drawn from the life of the smith (Stanzas 7–8).

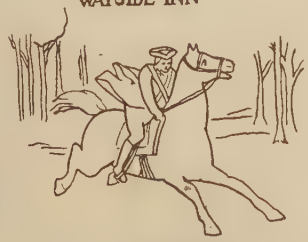
(c) Learn the history of the poem and be prepared to tell it to the pupils.

HENRY W. LONGFELLOW

1807 1882

EVANGELINE

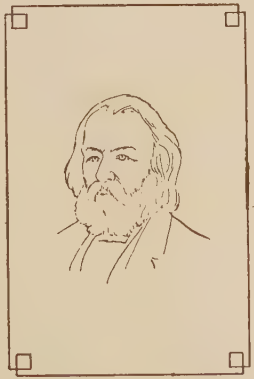
HOWE TAVERN
WAYSIDE INN



LISTEN MY CHILDREN
AND YOU SHALL HEAR
OF THE MIDNIGHT RIDE
OF PAUL REVERE

HALFWAY UP THE
STAIRS IT STANDS
AND POINTS AND
BECKONS WITH ITS
HANDS

BIRTH PLACE



LIVES OF GREAT MEN
ALL REMIND US
WE CAN MAKE OUR
LIVES SUBLIME

AND THUS, DEAR CHILDREN,
YOU HAVE MADE FOR ME
THIS DAY A JUBILEE
AND TO MY MORE THAN THREE
SCORE YEARS AND TEN
BROUGHT BACK MY YOUTH
AGAIN

CRAIGIE HOUSE

MINNEHAHA

MINNEHAHA FALLS

PRISCILLA
SEATED BESIDE HER WHEEL
AND THE CARDED WOOL
LIKE A SNOW-DRIFT
PILED AT HER FEET

Presentation. 1. Tell the story of the poem—what led to writing it, and when it was written.

2. Study the poem by sections with the class. The first study will include the first three stanzas.

3. Select the words whose meaning the pupils may not understand.

4. Select the objects named in the picture which the pupils may not have seen. To some city pupils the smithy and the chestnut tree will be strange objects. The bellows and the sledge may also be unfamiliar. *Sexton* may also need attention.

5. Have the pupils describe the picture. The description must include a description of the chestnut tree, the smithy and the smith.

Recitation. 1. Have the class read the first stanza.

2. Watch for faulty expression. This indicates lack of comprehension.

3. Read the second and third stanzas.

4. Call upon the different members to read the three stanzas. This will reveal their degree of comprehension of the division studied.

Other Sections. The second and third divisions can probably be taken at one lesson. The scene in the smithy will need explanation to the children who have not seen a forge. The flame is small and the roar of the bellows is the sound made by the current of air forced through the fire. The pupils may not know what chaff is. Be sure that the children get a correct mental picture of the smithy.

The fourth and fifth stanzas need but little explanation. The chief thought to bring out is that beneath a rough exterior the smith carries a kind and loving heart.

The last division should be taken at one lesson. The first stanza teaches the lesson of industry and shows the satisfaction arising from completing one's task. The last stanza refers to the lesson which the smith's life teaches, and compares his work at the forge with work of each individual in shaping his character. This poem is usually read before the pupils can fully grasp the thoughts in this stanza, yet they will get some comprehension of them. It is well to carry the study only so far as they can readily follow it.

Review. 1. After the entire poem has been studied according to this plan, have the members of the class read it. Each member should read the entire poem.

2. Have the class memorize the poem.

PAUL REVERE'S RIDE

"Paul Revere's Ride" was written in 1860 or 1861, and constitutes the landlord's tale in the first series of "Tales of a Wayside Inn," published in 1863. This volume comprises a collection of short poems, and the author presents them as though they were told by a number of friends who occasionally meet at the Old Howe Tavern in Sudbury, Massachusetts. This tavern was known as the "Wayside Inn," and is still standing. In the introduction to the poem, the poet describes the friends who are accustomed to gather around the fireside. The musician, who is characterized as "The Angel with the Violin," was the celebrated Ole Bull. The Sicilian was Professor Luige Monti, a celebrated scholar and lecturer. The theologian was Reverend Samuel Longfellow, the poet's brother, and the poet was Thomas William Parsons.

The appearance of this strong, patriotic poem just before the breaking out of the Civil War was not a mere coincidence. In "Paul Revere's Ride," as in "The Building of the Ship," Longfellow seizes on a common incident for the purpose of teaching a memorable lesson in patriotism. The teacher who fails to lead her pupils to realize this lesson fails to reach the climax of the poem.

PAUL REVERE'S RIDE

Listen, my children, and you shall hear
Of the midnight ride of Paul Revere,
On the eighteenth of April, in seventy-five;
Hardly a man is now alive
Who remembers that famous day and year.
He said to his friend, " If the British march
By land or sea from the town tonight,
Hang a lantern aloft in the belfry arch
Of the North Church tower as a signal light—
One, if by land, and two, if by sea;
And I on the opposite shore will be,
Ready to ride and spread the alarm
Through every Middlesex village and farm
For the country folk to be up and to arm."

Then he said "Good-night!" and with muffled oar
Silently rowed to the Charlestown shore,
Just as the moon rose over the bay,
Where swinging wide at her mooring lay
The Somerset, British man-of-war;
A phantom ship, with each mast and spar
Across the moon like a prison bar,
And a huge black hulk, that was magnified
By its own reflection in the tide.

Meanwhile, his friend, through alley and street,
Wanders and watches with eager ears,
Till in the silence around him he hears

The muster of men at the barrack door,
The sound of arms, and the tramp of feet,
And the measured tread of the grenadiers,
Marching down to their boats on the shore.

Then he climbed the tower of the Old North Church,
By wooden stairs, with stealthy tread,
To the belfry-chamber overhead,
And startled the pigeons from their perch
On the somber rafters, that round him made
Masses and moving shapes of shade—
By the trembling ladder, steep and tall,
To the highest window in the wall,
Where he paused to listen and look down
A moment on the roofs of the town,
And the moonlight flowing over all.

Beneath, in the churchyard, lay the dead,
In their night-encampment on the hill,
Wrapped in silence so deep and still
That he could hear, like a sentinel's tread,
The watchful night-wind, as it went
Creeping along from tent to tent,
And seeming to whisper, "All is well!"
A moment only he feels the spell
Of the place and the hour, and the secret dread
Of the lonely belfry and the dead;
For suddenly all his thoughts are bent
On a shadowy something far away,
Where the river widens to meet the bay—
A line of black that bends and floats
On the rising tide, like a bridge of boats.

Meanwhile, impatient to mount and ride,
Booted and spurred, with a heavy stride
On the opposite shore walked Paul Revere.
Now he patted his horse's side,
Now gazed at the landscape far and near,
Then, impetuous stamped the earth,
And turned and tightened his saddle-girth;
But mostly he watched with eager search
The belfry-tower of the Old North Church,
As it rose above the graves on the hill,
Lonely and spectral and somber and still.
And lo! as he looks, on the belfry's height
A glimmer, and then a gleam of light!
He springs to the saddle, the bridle he turns,
But lingers and gazes, till full on his sight
A second lamp in the belfry burns.

A hurry of hoofs in a village street,
A shape in the moonlight, a bulk in the dark,
And beneath, from the pebbles, in passing, a spark
Struck out by a steed flying fearless and fleet;
That was all! And yet, through the gloom and the light,
The fate of a nation was riding that night;
And the spark struck out by that steed, in his flight,
Kindled the land into flame with its heat.
He has left the village and mounted the steep,
And beneath him, tranquil and broad and deep,
Is the Mystic, meeting the ocean tides;
"And under the alders, that skirt its edge,
Now soft on the sand, now loud on the ledge,
Is heard the tramp of his steed as he rides.

It was twelve by the village clock
When he crossed the bridge into Medford town
He heard the crowing of the cock,
And the barking of the farmer's dog,
And felt the damp of the river's fog,
That rises after the sun goes down.

It was one by the village clock
When he galloped into Lexington.
He saw the gilded weathercock
Swim in the moonlight as he passed,
And the meeting-house windows, blank and bare,
Gaze at him with a spectral glare,
As if they already stood aghast
At the bloody work they would look upon.

It was two by the village clock,
When he came to the bridge in Concord town.
He heard the bleating of the flock,
And the twitter of birds among the trees,
And felt the breath of the morning breeze
Blowing over the meadows brown.
And one was safe and asleep in his bed
Who at the bridge would be first to fall,
Who that day would be lying dead,
Pierced by a British musket-ball.

You know the rest. In the books you have read,
How the British Regulars fired and fled—
How the farmers gave them ball for ball,
From behind each fence and farm-yard wall,
Chasing the red-coats down the lane,
Then crossing the fields to emerge again
Under the trees at the turn of the road,
And only pausing to fire and load.

So through the night rode Paul Revere;
And so through the night went his cry of alarm
To every Middlesex village and farm—
A cry of defiance and not of fear,
A voice in the darkness, a knock at the door
And a word that shall echo forevermore!
For, borne on the night-wind of the Past,
Through all our history, to the last,
In the hour of darkness and peril and need,
The people will waken and listen to hear
The hurrying hoof-beats of that steed
And the midnight message of Paul Revere.

Teacher's Preparation. 1. Become thoroughly familiar with the historical events.

2. By a careful study of the map of Boston and vicinity, obtain a clear idea of the geography of the locality. You should be able to draw the map and trace Revere's route upon it.

3. Study the poem for the purpose of dividing it into suitable sections. You will discover four divisions, to each of which one or more lessons should be devoted. These are:

(a) The introduction, lines 1–23.

(b) The movements of the friend, lines 24–56.

(c) The ride, lines 57–110.
(d) The conclusion, lines 111–130.

4. Make a thorough study of each division.

(a) Determine how it should be divided for the purpose of enabling the pupils to see the pictures brought out and to understand the thought expressed.

(b) Become familiar with all allusions and terms which the pupils will not readily understand; as *belfry arch,* line 8; *Middlesex,* line 13; and *muffled oar,* line 15.

(c) Select the rhetorical figures, and be prepared to explain those that the pupils may not understand; as *across the moon like a prison bar,* line 21; *eager ears,* line 25; *night encampment,* line 43; and *like a sentinel's tread,* line 45.

(d) Be sure that you comprehend the thought in the author's comments which he now and then introduces into the story. For instance, what does he mean by the line, "The fate of a nation was riding that night"? How will you explain the following lines?

"And the spark struck out by that steed, in his flight
Kindled the land into flame with its heat."

The last twelve lines of the poem will require special study for the purpose of determining their meaning.

Presentation. 1. *The General Idea.* Pupils sufficiently mature to study this poem to advantage are able to read it through to themselves, and in this, to get a general idea of it. This should be the first step.

2. *The Setting.* The setting includes the time, place, conditions and persons engaged. The time is at the breaking out of the Revolutionary War, and the pupils must become enthusiastic over the colonists' struggle for liberty if they are properly to appreciate the poem. The geography of the locality should be studied as already indicated. The conditions in and about Boston must be realized. Pupils should be led to see the effect upon the citizens of Boston of the presence of a British army in their midst. They should also realize the meaning underlying the colonists' determination to resist by force of arms, if necessary, any further encroachment on the part of the British. Persons in the poem in whom we are directly interested are Paul Revere and his friend. Revere was a silversmith and a patriot, and was active in resisting the encroachment of the British. We do not know the friend's name.

3. Answer satisfactorily to yourself the following questions:

Why was it necessary for Revere to know by which route the British marched?
How long a ride did Revere take?
In what part of Boston was the Old North Church?
Is it still standing?

Answers to these and similar questions, which occur to any teacher, show something of the knowledge necessary to give the poem a suitable setting.

A knowledge of the facts mentioned is essential to the underlying study of the poem. There are also many other facts, a knowledge of which will add interest to the study, but this knowledge is not essential to the understanding of the main thought of the narrative. Among these facts are the manner in which the rider was dressed, the sort of saddle and bridle on his horse, the location of the British camp in Boston, the difference in equipment of the American and British forces, and so on. The teacher should enter into details as far as the time devoted to the study and the ability of the class to understand them will make it profitable to do so. Many of the facts can be discovered by the pupils themselves, but the teacher should be able to narrate them in a vivacious and interesting manner. The study of these features should not, however, be allowed to overshadow the thought and beauty of the poem. Neither should all these facts be presented at once. After the general introduction, in which the leading historical and geographical facts are brought out, the others should be taken up as the study of the poem leads to them.

Recitation. 1. At the first lesson, take up the features of the general setting, as already explained.

2. Prepare the class for reading the first division, lines 1-23, at the next recitation. This preparation should consist of directions for studying this part of the poem. Give attention to words whose meaning the pupils may need to look up. If they have no means of ascertaining the meaning, give it to them at once. Give special attention to passages which will require careful study, such as that referring to the phantom ship, lines 20-23.

3. The second recitation should be devoted to the discussion and reading of the first section.

(a) Question the class on the meaning of the words they were required to look up.

(b) Ask the members to give their ideas of the difficult passages. How many can see "the huge black hulk, that was magnified by its own reflection in the tide"? How many can tell why it was necessary for Revere to know the route by which the troops were to march? How many can locate the Old North Church and Paul Revere on the opposite side of the river? The purpose of these questions should be to clear up all doubtful points and thus remove all obstruction to expression.

(c) Have the pupils read that part of the poem under discussion. Watch for faulty expression or hesitation, because they usually indicate failure to comprehend the thought. Pupils who understand the division should read as easily and as naturally as they would converse with their companions.

4. In the following recitations the other divisions should be treated in the same manner. If the work in the first two lessons is thoroughly done, the remainder of the poem can be read in two lessons. The younger pupils will not be able to comprehend fully the meaning brought out in the fourth division, lines 111-130, but they can grasp enough of it to enable them to understand that the purpose of the poem was to arouse the spirit of patriotism. In connection with this poem the pupils should read Emerson's "Concord Hymn."

Review. After the entire poem has been studied in this way, one or two recitations should be devoted to reading it as a whole. It will be wise, however, to defer this review until the pupils have studied one or more selections on other subjects.

Summary. We have herewith given complete plans for the study of two poems. These plans can readily be applied to the study of any literary selections suitable to the pupils of this grade. If the pupils are older, they should make a more detailed study of the selection, and the finer shades of meaning should be brought out. The main features of these plans are common to the study of all selections. The minor features must be determined by the teacher from the character of each selection. The underlying principle is, *Comprehension of thought must precede expression of thought.* Therefore, before oral reading is attempted, all obscure meaning must be made plain. Much of the faulty expression in oral reading is due to the fact that pupils are called upon to read selections which they do not understand.

Interesting Facts about Authors.

Longfellow

William Longfellow, from whom the family in America descended, came to Massachusetts in 1651 and settled in Newbury.

The poet's paternal grandfather was prominent in law and politics. He represented his town in the General Court of Massachusetts for eight years, was several years Senator from Cumberland County, and for fourteen years was judge of the Court of Common Pleas.

Longfellow's father was a leading lawyer of Portland. He held many offices of trust in his city and county, and was a member of the Eighteenth Congress.

On his mother's side, the poet was a descendant of John Alden, who came over in the "Mayflower" and whose wife, Priscilla, Longfellow immortalized in his "Courtship of Miles Standish."

Longfellow's early education was obtained in a private school and at the Portland Academy, where he prepared for college. In the poem "My Lost Youth" he gives a description of Portland and the surrounding country as they were at that time.

Longfellow's first published poem, "Lovewell's Fight," appeared in the "Portland Gazette" when he was fourteen.

Longfellow entered Bowdoin College with his brother Stephen in 1821. Among his classmates were John S. C. Abbott, the historian, and Nathaniel Hawthorne, who became one of the most distinguished American men of letters.

Longfellow's college life was uneventful. His charming manner and studious habits made him a favorite alike with students and instructors. While in college he wrote a number of poems, which were first published in the "United States Literary Gazette." From this journal they were copied by other papers, and thus received a general circula-

tion throughout the country. Only seven of these poems were included in later editions of the author's works.

Longfellow's father intended that he should be a lawyer, but a year's trial in his father's office convinced the young poet that he would never succeed in the legal profession. About this time he was chosen Professor of Modern Languages in Bowdoin College and his life work began.

The origin of some of Longfellow's most popular poems is of special interest. "The Psalm of Life" was written on a bright summer morning, as the poet sat at a small table, it is said, looking out over the landscape. "The Wreck of the Hesperus" was written by chance, after a violent storm. The story came into his mind in the evening. He went to bed, but could not sleep, so he arose and wrote the poem. "Excelsior" was suggested by his seeing that word upon a scrap of paper which he picked up on the street. He took from his pocket a letter which he had just received from Charles Sumner, and sitting upon the curbstone, wrote the poem on the back of the letter. The story on which "Evangeline" is founded was given to him by Hawthorne, who had received the facts from a friend. This friend thought Hawthorne could write an excellent novel on the incident, but he did not see anything in it for a story, so he gave it to Longfellow.

Bryant

Bryant came of sturdy New England stock. His mother was a descendant of John and Priscilla Alden, and his earliest American ancestor on his father's side is said to have come to America in the *Mayflower*. Bryant's father, his grandfather and his great-grandfather were all New England country doctors.

Bryant was a precocious child. He was sent to school when three years of age, and could read well at four. When only thirteen he published a volume of poems which had two editions.

The circumstances attending the publication of "Thanatopsis" are interesting. His father happened to find this poem in his son's desk. He copied it, took it to Boston and gave it to Mr. Willard Phillips, the editor of the "North American Review." The verses were shown to Richard H. Dana, who exclaimed, "You have been imposed upon; no one this side of the Atlantic is capable of writing such verses." Mr. Phillips thought that the father wrote them, but when the truth was known Bryant was invited to contribute regularly to the "Review."

After he became editor of the "New York Evening Post" Bryant took much interest in politics and warmly supported Lincoln. Though habitually dignified and self-controlled, he had a quick temper. Once he met a political adversary on the street and gave him a thrashing. The poet never ceased to regret that failure to preserve his dignity. His connection with the "Evening Post" lasted over fifty years.

Bryant is often thought of as grave and lacking in humor, but he had a quiet enjoyment of fun. A letter written to his mother about his marriage is interesting. It states that the ceremony included the muttering of certain cabalistic expressions which he was too frightened to recollect. He also says that he did not look for good qualities in his wife, but they trapped him before he was aware. He concludes, "And now I am married in spite of myself."

Bryant's life extended from the administration of Washington to that of Hayes, and for more than fifty years he exerted a strong influence on the development of the nation. He entered fully into the life of the country's metropolis as editor, orator and public man. So varied, indeed, were his duties that he had but little time to devote to writing poetry, but what he did write shows his supremacy in his own field. He was America's first great nature poet, writing of the bobolink, the fringed gentian, lakes and mountains.

He continued his editorial work until the last year of his life, and to the end was prominently identified with all worthy movements to further the progress of the arts and literature. When in his eighty-fourth year, he delivered an oration at the unveiling of the statue of Mazzini in Central Park. Exhausted by the effort and by the heat of the day, he fell on reaching home, and died two weeks later.

Bryant's life was unique. He saw American literature develop from infancy to maturity and his nation expand into a mighty power. No American represents more fully than Bryant the ideals and history of the American people.

Tennyson

Tennyson's first volume of poems was published by himself and his brother Charles.

Both boys contributed to its contents, and it is difficult to tell which one wrote the various poems. The volume appeared when Tennyson was seventeen.

Tennyson was a general favorite in college and formed many friendships. His closest friend was Arthur Hallam, son of the historian. Hallam died soon after leaving college. "In Memoriam" is Tennyson's immortal monument to his friend.

The general recognition of Tennyson as the greatest poet of his time dates from the publication of his famous volume in 1842. Among the poems in this volume were "The Talking Oak," "Dora," "Locksley Hall" and "Sir Galahad."

In 1883 Tennyson was offered the peerage by Queen Victoria, and was designated Baron of Aldworth and Faringford, January 18, 1884. Thereafter he was known as Lord Tennyson.

"Locksley Hall" was published in 1842. In 1886 appeared "Locksley Hall Sixty Years After," written when the poet was in his seventy-eighth year; yet the latter poem shows no lack of mental vigor.

Tennyson died October 7, 1892, and was buried in the "Poet's Corner" of Westminster Abbey.

Whittier

Until he was a young man, Whittier lived and worked on a farm. This was before farm machinery had been invented, and all work was performed by hand labor with the simplest tools. To his early training is undoubtedly due Whittier's sympathy with all forms of common labor. His interest in the lives of the working people of his time is shown in the series of poems known as "Songs of Labor." "The Shoemakers" and "The Huskers" are two of the best-known poems of this series.

The old farmhouse near Haverhill, Massachusetts, in which Whittier was born, and which he described in "Snow-Bound," was built in 1688. It is still standing, and with its furniture is carefully preserved. Many of the rooms are open to visitors.

When Whittier was fourteen, the schoolmaster whom he describes in "Snow-Bound" brought to his home a volume of Burns' poems. In reading this, the boy obtained much inspiration. The book influenced all of his life and many of his poems. In his poem "Burns," he speaks of this influence.

"O'er rank and pomp, as he had seen,
I saw the man uprising;
No longer common or unclean,
The child of God's baptizing!
With clearer eyes I saw the worth
Of life among the lowly;
The Bible at his Cotter's hearth
Had made my own more holy."

Whittier's first slavery poem was published in the local paper when he was eighteen. The lines attracted the attention of William Lloyd Garrison, who was then but twenty. He went to the Whittier homestead and urged Whittier's father to give him an education. To his plea the father replied, "Sir, poetry will not give him bread." Whittier's schooling was limited, being confined to attendance at the common school in his district, and two terms at the Haverhill Academy.

He began his literary labors as the hired editor on the "American Manufacturer," though while attending the academy he wrote nearly one hundred poems, many of which appeared in the "Haverhill Gazette."

Whittier early became interested in politics, and when a young man was favorably considered for a congressman. His love for liberty, however, caused him to join the Abolitionists, and this ended his career in every party which at that time was laboring to succeed at the polls.

He was one of the leaders in the movement to abolish slavery, and did much by his writings and influence to accomplish this result. Whittier was a friend and admirer of Charles Sumner, and was largely instrumental in securing his election to the Senate.

"Barbara Frietchie," considered to be one of the best ballads of the Civil War, was written in 1863. There has been a good deal of controversy as to whether or not the ballad was founded on fact. Whittier said that the poem conformed strictly to the incident as he learned it from trustworthy sources. Barbara Frietchie was a gentlewoman highly esteemed in the community in which she lived. She was a stanch Unionist, and it is said that when the Confederates entered her yard, she denounced them and shook her cane in their faces, and drove them out. It was also stated that May Quantrelle, a lady living in another part of the city, did wave the Union flag at the Confederate forces. In the narrative as it reached Whittier, the incidents were probably confused.

Notwithstanding his power as an anti-slavery advocate, Whittier lived a quiet, retired life. When he left the farm, he removed to a smaller house near Amesbury, Massachusetts, where he lived during the most of his life. He died at Hampton Falls, New Hampshire, September 7, 1892.

Holmes

Holmes was a cousin of Wendell Phillips, and a direct descendant of Anne Bradstreet, the first American poetess. The Dorothy Q described in his poem of that name was Dorothy Quincy, his great-grandmother.

The deacon who built the "one-hoss shay" was David Holmes, the poet's grandfather. He was a captain in the French and Indian War, and a surgeon in the Revolutionary War.

"Old Ironsides," one of the most famous of Holmes's poems, was written in 1830, and was inspired by the order of the Secretary of the Navy to destroy the frigate "Constitution." Holmes read the order in a newspaper, and on a scrap of paper with a lead pencil he wrote the stanzas at once, and sent them to the "Boston Daily Advertiser." The poem was copied by the press throughout the country, and was even printed on handbills and circulated about the streets of Washington. It created such widespread indignation that the Secretary countermanded this order, and the old ship still floats. This poem was written when Holmes was a law student and only twenty-one years of age. This is probably the only instance in history where the verses of a law student reversed the policy of the government. His "Plea for the Old South" performed a somewhat similar service.

Holmes graduated from Harvard College in 1829. Among his classmates were a number of men who gained a world-wide or national reputation in their respective callings. In his poem "The Boys," written for the class reunion of 1859, he refers in a pleasant way to some of these distinguished classmates. The "judge" of the poem was George T. Bigelow, Chief-Justice of Massachusetts. The "boy with the three-decker brain," was B. R. Curtis, a justice of the Supreme Court of the United States. The "boy with the grave mathematical look," was Professor Benjamin Peirce of Harvard, one of the most celebrated mathematicians of his time. James Freeman Clarke and Reverend Samuel Smith, the author of "America," were also members of this class.

We often hear Boston referred to as the "Hub of the Universe," but we seldom ascribe the origin of this expression to Holmes. In his "Autocrat of the Breakfast Table," he makes one of his characters say, "Boston State House is the hub of the solar system. You couldn't pry that out of a Boston man if you had the tire of all creation straightened out for a crowbar."

Holmes also was the originator of the name of the "Atlantic Monthly." When it was decided to start this periodical the editorship was offered to James Russell Lowell, who consented to accept the position only on condition that Holmes should be secured as a regular contributor. To this Holmes replied, "You see, the doctor is like a bright mountain stream that has been dammed up among the hills, and is waiting for an outlet into the Atlantic." From this incident the periodical took its name.

Holmes' fame is not confined to the realms of literature. He was for thirty-five years Professor of Physiology and Anatomy in Harvard College, and was one of the leading medical authorities of his day. It was due to him that the microscope was introduced into medical practice in the United States.

Lowell

Lowell came of a family distinguished in many fields of activity. His father, grandfather and great-grandfather were graduates of Harvard College; his father was pastor of the First Church in Boston. His grandfather, John Lowell, as a member of the Constitutional Convention of Massachusetts, introduced into the Bill of Rights of the state a clause abolishing slavery.

An uncle of the poet, Francis Cabot Lowell, was a successful manufacturer, and the city of Lowell was named for him. Another uncle founded the Lowell Institute in Boston.

One of Lowell's ancestors on his mother's side was a signer of the Declaration of Independence.

During his college life, Lowell came in contact with many distinguished men of letters. Among his teachers were Benjamin Peirce, the mathematician of Holmes's "famous Class of '29," and Longfellow. Lowell himself tells us that he read, while in college, "almost everything except the text-books prescribed by the faculty." During his senior year he

became so indifferent to college regulations that the faculty requested that he study for a time at Concord, under a tutor. It was here that he met Emerson, of whom he later became an ardent admirer. It was also at this time that he first felt the stirrings of his anti-slavery convictions.

Lowell was married in 1844 to a sister of one of his classmates, Maria White. She was a noble woman of lofty poetic genius, and by her inspiration she greatly influenced her gifted husband. Some of the most touchingly beautiful of Lowell's poems were written about his wife and children. "The Changeling" and "She Came and Went" were written in commemoration of his first child, Blanche, who died when two years of age. His poem which all children know and love is "The First Snowfall." In this he speaks of his second little daughter, Mabel, and of her sister "folded close under deepening snow." When he sent this poem to the periodical in which it was published, Lowell wrote, "Print that as if you loved it. Let not a comma be blundered. * * * May you never have the key which shall unlock the whole meaning of the poem to you."

"The Burial" in part was written after the death of Lowell's third daughter, Rose, who lived only a few months. Into it is interwoven the memory of his oldest child, especially in the last stanza, where he speaks of the little shoe in the corner. One of Lowell's biographers mentions that after Blanche was buried, her father took her tiny shoes, the only ones she had ever worn, and hung them in his chamber. There they stayed till his own death. Of his wife's death he says, "Something broke my life in two, and I cannot piece it together again."

Lowell was essentially a nature poet. In the famous "Prelude to Part Second" in his "Vision of Sir Launfal" he describes a scene which he himself enjoyed. In one of his letters he tells of a walk he took to Watertown over the snow in the moonlight. In his own words, "Orion was rising behind me, and as I stood on the hill just before you enter the village, the stillness of the fields around me was delicious, broken only by the tinkle of a little brook which runs too swiftly for frost to catch it. My picture of the brook in 'Sir Launfal' was drawn from it."

Lowell was our representative man of letters. He was a great critic, an essayist, poet, diplomat and scholar. As a poet he had a wider range than any other of our American poets. In his poetry he was an appreciative lover of Nature, a humorist, a patriot and a satirist, and he also wrote poems of sincere thought. His versatility is equaled by no other American man of letters.

Scott

Sir Walter Scott came of a well-known Scottish family. Scott himself said that his birth was "neither distinguished nor sordid;" in the common language of the country the Scotts were "gentlefolk." Pride of family Scott considered "natural to a man of imagination." This pride sometimes led him into courses to his disadvantage, but at the same time it constantly spurred him on to exertion and to a high conception of duty. On the ceilings of Abbotsford are displayed the arms of about a dozen Border families with whom Scott's family claimed relationship.

In his autobiography Scott gives many interesting details of his boyhood. For example, he was sometimes called a dunce and an idler. Very carefully he explains why some people who did not like him might misrepresent the facts. As an infant of two years he had suffered severely from a fever which left its influence on him for life, his right leg being a trifle shorter than his left. His health as a boy was uncertain and his attendance at school was consequently irregular. Thus his studies suffered from forced inattention. Even as a child he seems to have been a favorite with his elders, and he spent many happy hours listening to the stories they gladly told him. As he grew older he steadily pursued his favorite studies of history and romance. He acquired a reputation among his schoolfellows for queer bits of knowledge and for story-telling—a reputation he worked hard to sustain as compensation for his indifferent standing in the regular school work. He studied French and Italian in order that he might read more romances in the original. This willingness to study hard in the pursuit of his pleasure was characteristic of Scott. He ransacked libraries for new material and by the time he was twenty-one was known for his ability in deciphering old manuscripts.

It was as a poet that Scott first established a literary reputation. In 1796 he published a number of translations from the German, and six years later issued the first part of his collection of *The Minstrelsy of the Scottish*

Border; but it was not till 1805 that the *Lay of the Last Minstrel* placed him among the famous poets. This was followed by *Marmion* and the *Lady of the Lake,* both of which added greatly to Scott's popularity. Meanwhile he had been writing, though anonymously, the remarkable series of *Waverley Novels.* Not until five years before his death did he publicly acknowledge the authorship of these books, but the fact had been more or less of an open secret for a number of years.

The last years of his life were filled with trouble and sorrow. His business ventures turned out unfortunately and he was forced into bankruptcy. He labored in every way to pay off the enormous debt of his partners. In 1830 he suffered a stroke of paralysis from which he never fully recovered. The last months of his life were pathetic, as he died happy in the delusion that he had paid all his debts. No man ever showed a nobler sense of duty than Scott, when he literally wore himself out to pay obligations he could easily have avoided.

Louisa M. Alcott

Louisa M. Alcott, the best American writer of children's stories, was of English ancestry. Her ancestors on her father's side were connected with the founders and governors of the chief New England colonies, and her mother was descended from a distinguished New England family. Miss Alcott's father, the famous Amos Bronson Alcott, was an unpractical idealist, though a very scholarly man. Her mother was a woman of fine mind, broad sympathies and unselfish generosity. Their gifted daughter seems to have inherited striking traits of both parents.

When Louisa was two years old the family removed to Boston, where Mr. Alcott opened a school. During this period, Louisa began a journal at the age of seven, which she kept for many years. Her personal experiences and those of her family, as there recorded, furnish very interesting reading.

In 1840, when Louisa was eight years of age, the Alcotts removed to Concord, Massachusetts, where some of her happiest days were spent. Among her neighbors were the little Emersons, Channings and Hawthornes, a noteworthy group of playmates. Some of their childish plays she afterwards reproduced in "Little Men."

Amos Alcott was a man of scholarly attainments and lofty ideals, but he lacked the ability to earn a comfortable living for his family. For many years his devoted wife and children suffered many privations, and the burden was not lifted until Louisa was old enough to shoulder some of the responsibility. The Alcott children were taught by their father, who had peculiar views on education and favored the Socratic method of questioning. Their minds were led to develop gradually and they were encouraged to express themselves freely and naturally.

In 1845 the family acquired a home in Concord, which is described in "Little Women," Miss Alcott's masterpiece. That story, best beloved of books by children of two generations, is based on the actual experiences of the Alcott family. The Meg of the book is the elder sister of Louisa. The wayward Jo is Louisa herself. Beth is a younger sister, Elizabeth, and Amy is the pretty and graceful May Alcott. Mrs. March is a reproduction of Mrs. Alcott, only, as Louisa says, "Not half good enough." The charming Laurie is a Polish lad whom the authoress met in Europe. The great charm of the book is its naturalness. It rings true. This can be easily understood when we consider that Miss Alcott was writing about her own life and that of her family. The book has been translated into French, German and Dutch.

Louisa wrote rhymes and plays when a girl, and had a story published which she wrote when she was but sixteen. Her real literary career began, however, when she was twenty-two, when she published a book of stories for which she received $32. For several years she devoted herself to making the family more comfortable, and she taught, sewed and wrote. After buying bonnets for the sisters with money received from writing, she said, "The inside of my head can cover the outside."

During the Civil War she became a nurse in a hospital, and has reproduced some of her experiences in "Hospital Sketches." This book has deservedly become very popular. The nursing resulted in a severe illness, and her health was never so robust again. "Old Fashioned Girl" is a bright and cheerful story, but it was written under very depressing circumstances. In her best books, Miss Alcott seems to be all humor and good cheer, but her life was a hard one, full of work and responsibility and saddened by the death of her mother and two younger sisters.

Her influence has been of the best. Her books for children, by which she is best

known, are both wholesome and entertaining, and undoubtedly will be the delight of young readers for years to come.

Hawthorne

Hawthorne was a descendant of William Hawthorne, who came to Massachusetts from England in 1630. This ancestor was a stern Puritan and his son was one of the judges who condemned to death some of the victims of the Salem witchcraft. The Hawthornes became seamen; the grandfather of the novelist commanded a privateer in the Revolution and his father was a captain in the merchant marine.

Hawthorne's early days were spent in Salem, full of reminiscences of the stern old Puritan days. As a child, he read Shakespeare, Milton, Pope, Bunyan and Thomson, and with his own money bought a copy of Spenser's "Faery Queene." Among his teachers was Worcester, the famous dictionary-maker.

A part of his boyhood was spent in Maine on his uncle's estate. The wild scenery of the sparsely settled region and the primitive manners of the people greatly stimulated his imagination. He says of this period, "I lived like a bird of the air so perfect was the freedom I enjoyed." During the moonlight nights he would skate until midnight all alone upon Sebago Lake, "with the deep shadows of the icy hills on either side."

He entered Bowdoin College at the age of seventeen. Among his classmates were Longfellow and Franklin Pierce, the latter of whom became his lifelong and well-beloved friend. It is said that in college he ranked low in mathematics and metaphysics and that he found the required chapel declamations appalling. For twelve years after leaving college he lived in retirement in Salem, where, in an upper room of his mother's home, he wrote and dreamed. He speaks of this room as a place where he sat a long, long time, waiting for the world to know him. The result of these long years of effort was "Twice-Told Tales," his first important work.

Hawthorne was thoughtful, reserved and quiet, but at times he enjoyed fun and jokes. His friend and biographer, James T. Fields, tells us that while they were in England together, they attended a reception given by an intelligent English lady, who asked Hawthorne to write in her autograph album. Hawthorne implored Fields to tell him what

Outline on Reading

I. Purposes of Study of Reading.
- (1) Thought getting and thought giving
- (2) Acquiring general knowledge
- (3) Development of taste for best literature
  - (a) Increasing general culture
  - (b) Promoting scholarly speech
- (4) Training the mental powers
  - (a) To strengthen memory
  - (b) To develop the will through increase of knowledge
  - (c) To render choice easier
  - (d) To strengthen imagination

II. Reading in Primary Grades
- (1) Purposes of primary reading
  - (a) Acquiring thought
  - (b) Adding to vocabulary
  - (c) Correct pronunciation
- (2) Material used
  - (a) Courses of study as provided
  - (b) Regularly adopted texts
  - (c) Supplementary readers and primers

III. Reading in Intermediate Grades
- (1) Purposes of the reading class
  - (a) Mastery of thought
  - (b) Adding to vocabulary
  - (c) Inducing a desire for good literature
  - (d) Correct inflection and expression
- (2) Material used
  (Same as II, (2) above)
- (3) Devices for increasing interest
  - (a) Discussions and explanations
  - (b) Geographical references studied
  - (c) Mythological references explained
  - (d) Historical setting made clear

IV. Lasting Benefits
(Name at least three, and assign reasons.)

to say, and the latter, in a spirit of fun, suggested the old doggerel:

"When this you see
Remember me."

The famous romancer immediately wrote the couplet and signed his name to it.

On the way home from Europe, Mr. Fields found the Atlantic too much for him and suffered greatly from seasickness. Hawthorne was a splendid sailor and used to console his friend by suggesting all sorts of fanciful dishes. "He would lie by my side," says Mr. Fields, "and tell me to try a few roc's eggs beaten up by mermaid on a dolphin's back, or gruel made from a sheaf of Robin Hood's arrows. He thought the proper clothing for a sea trip to be raven-down stockings, and sable clouds with a silver lining."

Hawthorne's last days were spent quietly in Concord. Emerson was one of his neighbors, and he speaks of his coming to call with a "sunbeam in his face." Just before he died he started a new romance, and the unfinished manuscript was laid upon his coffin. He was buried under a group of pines on a hillside overlooking the historic fields of Concord. Among the friends who saw him laid to rest were Emerson, Channing, Agassiz, Lowell, Alcott, Holmes and Franklin Pierce.

READING, Methods of Teaching. Reading is a thought-getting and thought-giving process. The first is silent reading; the second, oral reading. The purpose of teaching a child to read is to enable him, first, to get the thought from the printed page, and second, to give that thought to others. Thought-getting, or learning to read, characterizes the greater part of the instruction in reading during the first three years the child is in school. The process includes the following steps, each of which should receive careful attention: (1) Learning the meaning of words; (2) learning the forms of words; (3) learning the sound of words, or their pronunciation; (4) understanding the thought in the sentence; (5) understanding the selection read.

Primary Grades. The reading in the primary grades includes that of the first three years in the well-graded school. During this time the child should not only learn to recognize words and sentences, but he should become reasonably proficient in reading from books within his capacity. In order that this end may be reached the teacher should give careful attention to two phases of the work:

Methods. There are three methods of teaching primary reading in general use. They are known as the sentence method, the word method and the phonic method. The sentence method begins with the sentence, which the pupils are taught to read at sight, then proceeds to the study of the separate words in the sentence, so that they may be recognized alone. Since the sentence is the unit of thought and of expression, and since the child grasps things as wholes, this is by far the most desirable method to use at the beginning. It is much easier to teach a child to read a sentence, as, "I have a cat; John has a book," than it is to teach him to recognize the same number of words when they have no relation to each other. Hence the skilful teacher in reading selects, for her first lessons, certain objects in which the children will take a lively interest, and after obtaining from them, through questioning, desired sentences, she writes these upon the board in a plain hand, then has the pupils read them.

The next step is to lead the pupils to recognize the different words and phrases as they occur, by asking different questions and leading the pupils to make other statements about the object. This is usually accomplished by having the pupils read sentences containing the same words in different order. After drills of this sort the pupils quite readily recognize the different words in the sentence when written upon the board. From this it will be seen that the sentence method and the word method are inseparable. In fact, the so-called word method is only a phase of teaching reading by the sentence method.

The phonic method consists in the analysis of words, for the purpose of discovering the sounds of the letters which the words contain. It should not be introduced until the pupils have been reading for some months. In the second reader grade, it can be applied sucessfully if too much is not attempted, and in the third reader grade a good deal of attention should be given it, because when once learned, this method places the pupil in possession of the ability to discover and pronounce a great many new words for himself. From this it will be seen that the successful method in reading consists in the blending of the three methods here described,

and no teacher can obtain the best results without using them all, and substantially in the order named.

The Recitation. The teacher should make careful preparation for each recitation. In doing this, she should observe the following points:

(1) Plan to present the lesson in an interesting manner; (2) plan to have the class learn one or more new words; (3) review the words previously learned, by combining them in new sentences; (4) select for the lessons such sentences as will prepare the pupils for the reader. Before the book is placed in their hands, they should learn all of the words and many of the sentences found on the first eight or ten pages. In rural schools it is necessary that the books be placed in the hands of the pupils at the earliest possible date; hence, the teacher should give the first reader careful study, before beginning the work in reading with her entering class.

In the recitation, the reading and the word study must be carried along together, but if much time is needed for word study, greater progress is made by devoting one period to reading and another to drill on words. The teacher should lead her pupils to read in natural tones and with correct expression. In case they have difficulty with pronunciation, drill exercises on the difficult words should be given.

Intermediate and Grammar Grades. The work in reading in these grades is for the purpose of leading the child to love good literature, to acquire ability in silent reading and fluency in oral expression. In order that these ends may be secured, the intellectual element in reading should receive careful attention in these grades. Children cannot take interest in what they do not understand; hence, when a difficult selection is presented, it is wise for the teacher to discuss the selection with the class before the lesson is studied. In doing this, she should explain all the difficult passages. At the time of the recitation the pupil's understanding of these passages should be tested before the lesson is read; otherwise, he will stumble in the reading.

At this period the pupils should be introduced to the use of reference works, if such works are at their disposal. In case they are not, the teacher should give the information which the pupils cannot obtain for themselves. It is all-important that the class get the proper setting for the lesson. This setting should include the imaging of the scene and an understanding of the most important mythological, historical, geographical and other allusions which the selection may contain. The emotion necessary to proper expression will naturally follow the comprehension of the subject matter.

In order that the teacher may successfully conduct exercises in reading in these grades, it is often necessary that she study broadly, as the selections frequently contain allusions to the various branches of natural science, mythology, history, art and the greater works of literature.

Much valuable assistance in teaching reading may be obtained from the prefaces found in all of the better series of readers. These should be carefully studied by every teacher. The teacher of primary reading should also make a thorough study of the readers which the pupils are to use. This study should be from the teacher's point of view and should enable her to obtain a thorough understanding of the plan of each book, of its gradation and of the steps necessary to lead the pupils from the first to the second reader, and from the second to the third reader. Many series of readers are defective in this respect and need more or less supplemental work.

READING, *red'ing,* **OF EARL'EY,** Rufus Daniel Isaacs, first Viscount (1860–), an English nobleman of Jewish faith, who has been Lord Chief Justice of England since 1913. In 1915 he headed an Anglo-French Commission to the United States to negotiate a $500,000,000 loan for the allies. Viscount Reading was born in London and was educated at the University College School there, in Brussels and in Hanover. In 1898 he became Queen's Counsel, was elected to the House of Commons as a Liberal from Reading in 1904, and later was appointed successively Solicitor-General and Attorney-General. In 1912 he entered the Cabinet, was made Lord Chief Justice in 1913, and was created baron in 1914 and viscount in 1916. In 1918 he was sent as ambassador to the United States by temporary appointment.

READING, *red'ing,* Pa., fourth city in size in the state and the county seat of Berks County, fifty-eight miles northwest of Philadelphia, on the Schuylkill River, on the Schuylkill Canal and on the Pennsylvania

and the Philadelphia & Reading railroads. It is connected with Philadelphia and with surrounding cities and towns by electric railways. The city has a beautiful situation on a bluff which rises gently from the river to Mount Penn, on the east. The Neversink Mountains, just south of the city, have a height of about 1,000 feet. Several hotels and popular resorts, are located on these mountains.

There are separate high schools for girls and boys. There are also excellent private schools and business colleges. There are three public hospitals. Some of the other prominent buildings are a city hall, a courthouse, a postoffice, a Masonic Temple, a museum and art gallery and a Y. M. C. A. There are many fine business blocks and churches.

The city is near the anthracite coal fields, in a region of large mineral wealth, and is in a very fertile agricultural country. There is a great variety of manufactures, about one-fourth of which consist of iron and steel products. Many of the steel projectiles used by the United States navy and the letter boxes seen on the streets throughout the country are made here. The factories number nearly 500. Here are the principal shops of the Philadelphia & Reading Railroad, foundries, machine shops, cigar factories, knitting and hosiery mills, paper and wood pulp works, hat factories and carriage works. There are fourteen banking institutions. The place was first settled by Germans, but many English colonists came later and named it after Reading, England. It is the chief center of the Pennsylvania German population. It was laid out in 1748, was incorporated as a borough in 1783 and was chartered as a city in 1847. The commission form of government was adopted in 1913. Population, 1910, 96,071; in 1917, 111,607 (Federal estimate).

REAGAN, *re'gan,* JOHN HENNINGER (1818–1905), an American statesman, born in Sevier County, Tenn. At the age of twenty-one he went to Texas, which was thereafter his home. He studied law in 1847, was elected to the state legislature and later was chosen district judge. From 1857 to 1861 he represented his state in Congress, resigning when Texas seceded from the Union. Early in the latter year he was elected to the provisional Confederate Congress, and in May was appointed Postmaster-General of the Confederacy. After the war he served in the United States House of Representatives from 1875 to 1887, and in the Senate for the four years following. As chairman of the committee on commerce he drafted, with Cullom, the Interstate Commerce Act, passed in 1887, one of the most important measures introduced in Congress since the Civil War.

REALISM, *re'al iz'm,* a doctrine based on the theory that general notions which are regarded as necessary truths do not exist in the mind prior to appearance, but are the products of sensation and perception. Some advocates of this theory went so far as to assert that individuals of a class exist in name only and that the only reality is the universal. For example, *tree,* as a general notion, has existence, is a reality, but *trees* have no individual existence. See CONCEPT; PERCEPTION.

REAL PROPERTY, or REAL ESTATE, includes land, the houses and trees upon it and the minerals beneath the surface. In law, the term includes land and all property that cannot be removed without being destroyed. At the death of the owner, real property descends to his legal heirs. In case the personal property fails to pay the indebtedness, the administrator is required to sell enough real estate to make up the deficiency. Real estate cannot be sold except on a written contract. See DEED.

REAPING MACHINE, a machine used in harvesting wheat, oats and other small grains. The machine is drawn by horses or tractors, the cutting machinery being driven by gearing connected with the wheels on which the machine moves. The cutting part consists of a cutter-bar and a knife-bar. The cutter-bar is a steel bar six feet long, five inches wide and a half inch thick and has long, steel points, called fingers, riveted to it. The knife-bar is a small steel bar to which triangular knives are riveted. This slides through a groove in the fingers and is attached at one end to a crank, which when the machine is in motion gives a rapid forward and backward motion to the knives. As the machine moves along a reel bends the grain back against the knives and picks up bent and broken stalks, so that none is lost.

The Modern Harvester. In the original reaper the grain as it was cut fell upon a table, from which it was raked by some one following the machine or sitting upon a seat back of the driver. Later a raking apparatus was supplied, and in time this was re-

placed by a binding apparatus, forming what is now known as the harvester and binder, or self-binder.

The modern harvester has a table upon which the grain falls and from which it passes to a canvas belt for carrying the grain to the binding box, where it is packed until enough to form a bundle has been gathered. When the box is filled, a catch operating the binding apparatus sets this in motion and the bundle is firmly tied with binding twine, when it is thrown by a spring from the binding box, either upon a carrier or upon the ground, according to the pattern of the machine. It requires four horses to operate one of these machines successfully, and under ordinary conditions it will cut ten acres of grain a day. On large wheat ranches the machines are operated by tractors, a number of machines being drawn by one tractor.

The reaping machine in its present state of perfection is due largely to Cyrus H. McCormick of Illinois. While there are many patterns on the market, all are built on the plan which Mr. McCormick originated.

In 1918 there were 51,881,000 acres of wheat in the United States, and the crop amounted to nearly 919,000,000 bushels. It would have taken an army of 1,000,000 men two months to harvest this crop with the old-fashioned sickle. What is true of the wheat crop in the United States applies as well to conditions in all wheat-producing countries. Without the modern harvester the great crops of wheat, oats, barley and other grains could not be raised.

The harvester has done more than any other invention towards increasing the world's food supply. It is found in every country where large crops of wheat are raised, and there are over 2,000,000 machines in operation. See McCormick, Cyrus Hall; Wheat; Oats.

REASON, or REASONING. Reasoning is the third or final stage in thinking. In reasoning we compare two judgments, and conclude that they agree or disagree. One of the judgments is a general or class idea, the other is a particular, or a more restricted, idea. To illustrate, we have a piece of oak and ask the question, "Will this oak burn?" In answering the question we pursue the following trend of thought:

All wood burns.
This oak is wood.
Therefore this oak will burn.

In formal reasoning, the general proposition is called the *major premise*, and the particular proposition the *minor premise*. These premises and the conclusion constitute a *syllogism* (which see).

Reasoning involves inference, and is based upon one's knowledge and experience. Correct conclusions depend upon accurate knowledge and clear thinking; therefore observation lies at the foundation of reasoning. Reasoning is a selective process. A good reasoner is able so to classify his ideas that he can select those bearing upon the problem in hand and reject the others. A boy has caught a bat and wants to know whether or not the bat is a bird. As he examines the bat—its head, body, legs, wings—he must hold in mind the corresponding parts of a bird. In other words, he must think bat and bird, and not bat and squirrel, or bat and any other animal, if he is to arrive at a correct conclusion. Moreover, unless he is acquainted with the structure of birds, he is likely to form a wrong conclusion, and judge the bat to be a bird.

Reasoning is the most difficult of the mental activities, and develops later than the others. An act of reasoning brings into play all the other activities of the mind—observation, memory, judgment, imagination, feeling and will.

Training the Reason. Although reason reaches its fullness of power later than the other mental activities, we should not infer that children do not reason; in fact, they begin to draw inferences and conclusions much earlier than most people think. At first this power of reasoning is weak, and it should not be stimulated too strongly, but it should be given opportunity to exercise within its capacity.

Teachers and parents will find the following suggestions helpful:

1. Reason grows only by use. Therefore, within their capacity see that children reason. By questions and suggestions lead children to think things out for themselves. Learning reasons is not reasoning.

2. Proceed slowly. Be content with obvious reasons at first.

3. Lead children to look for the reasons for things in an attractive manner. Arithmetic is one of the best subjects for leading pupils to see the reason why.

4. Test inferences and facts, and lead the children to see that hasty conclusions are usually false.

5. Intense feeling interferes with sound reasoning; never ask a child to reason nor

attempt to reason with him when he is excited or otherwise stirred by deep emotion.

Related Articles. Consult the following titles for additional information:

Attention	Judgment
Concept	Memory
Deductive Method	Perception
Imagination	Syllogism
Inductive Method	Will

REBELLION, *re bel'yun,* **OF 1837,** a simultaneous uprising in the two provinces of Eastern Canada, made by the radical political element in an effort to secure a more representative government. By the Constitutional Act of 1791 Canada had been divided into Upper Canada (later Ontario) and Lower Canada (later Quebec). For fifty years these two provinces maintained separate governments; each was ruled by a governor, an executive council corresponding to a cabinet, a legislative council and an assembly elected by the people. As the governor and the legislative and executive councils were appointed by the king, there was great discontent over the operation of the law. In Lower Canada, occupied largely by French, discontent arose almost immediately, and there continued to be friction between the assembly, made up almost entirely of French, on the one hand, and the legislative council and the governor, all English, on the other. The troubles came to a focus in 1837. The assembly wanted full control of the provincial treasury, an elective legislative council and the right to fix the status of the French language and the Roman Catholic religion in the province. The British government sent over a commission to examine the situation. Its recommendations precipitated an armed revolt led by Louis Joseph Papineau (which see). There were several small engagements between the rebels and the British forces, but the trouble was quickly put down.

Parallel with this movement for political reform in the lower province, a similar one had been taking place in Upper Canada. There, even greater emphasis was placed upon responsible government, and the more radical element dreamed of complete independence and a republic. Emboldened by the revolt in the lower province, William L. Mackenzie broke with Baldwin and the more moderate reformers and organized a rebellion, renouncing all allegiance to England. This was soon quelled.

Thus the rebellion in each quarter ended in a fiasco. It had one important result, however. Lord Durham was sent over from England as Governor-General and High Commissioner; and although he failed to cope with the situation successfully as an administrator, a famous report prepared by him in 1839, suggesting the causes of the trouble and remedies for it, led to the Act of Union of 1840. See CANADA, subhead *History.*

RECALL, THE, a provision in government which enables the people to remove officials from office before the end of their term. Originally the law applied only to officials who were elected, but its application has been extended to appointive offices and, in some states, to judges. Proceedings under the recall act are begun by filing, with a designated official, a petition which has the required number of signatures (twenty to thirty per cent of the voters at the last election), and sets forth charges against the official whose removal is sought. Thereupon a recall election is ordered. The name of the official accused is placed on the ballot, and other candidates are placed in nomination by the usual method. The special election thus ordered is conducted like any other. If the accused official receives a majority vote, he is vindicated and remains in office. If another candidate receives a majority, the accused is retired. The recall was first adopted in America in Los Angeles, Calif., in 1903, and has since been adopted for state-wide purposes in more than twenty states and in many cities. See INITIATIVE; REFERENDUM.

RECEIPT, *re seet',* a written acknowledgment or account of something received, as money or goods. A receipt for money may be in part or in full payment of a debt, and if true, not fraudulently secured and uncontradicted by other evidence, it operates as an acquittance or discharge of the debt or part of the debt which it includes. A receipt should specify for what it is given—for payment in full, for payment on account, or for payment of some special account. A bill marked *paid* is a receipt.

RECEIVER, *re seev'er,* usually one appointed by a court to take charge of money or property involved in litigation between parties. Sometimes a receiver is appointed to manage the property of an incompetent person. A receiver is an officer of the court and is empowered to collect rents, issues and profits thereof pending the final settlement. Property which is subject to judicial con-

troversy is always in danger of being lost, and therefore the appointment of a receiver is an important step towards its preservation.

The receiver is expected to exercise his judgment in the management of such property, and negligence exposes him to the charge of misconduct. When in doubt as to the best course to pursue he may apply to the court for authorization. In general, a receiver has no authority to sue unless directed by the court to do so. Among the typical cases requiring a receiver are the following:

1. If a person dies without making a will a receiver or an administrator is needed to manage his property until the rightful heirs come into possession of it.
2. If a property owner is an infant or a lunatic without guardian.
3. When two persons lay claim to a property, neither can have anything to do with it until the court has rendered its decision; and in such case a receiver is necessary.
4. When a relative accredited with the guardianship of property is guilty of neglect or mismanagement, a receiver may be appointed.
5. When partners cannot agree upon the conduct of their business, the case requires a receiver.
6. In the case of insolvency a receiver is appointed to satisfy as far as possible the claims of creditors.

RECIPROCITY, a tariff arrangement between two nations in which each agrees to import goods from the other free of duty or at a rate of tariff lower than that fixed by law. Reciprocity affords nations which hold to a strict protective tariff policy opportunity to make tariff agreements with other nations which may be advantageous to both parties.

The United States has agreed to a few reciprocity treaties. The McKinley tariff law of 1890 provided for the admission of sugar and certain other articles free from those countries which gave reciprocal trade favors to the United States. The Dingley Act of 1897 greatly limited the government's power in respect to framing reciprocity treaties, making them dependent upon the Senate's sanction. Under this law treaties were negotiated with France, Portugal and Italy. The tariff act of 1909 was against reciprocity. It withdrew from the President the limited power he had to make reciprocity agreements, and cancelled reciprocity agreements with nine countries, including England and Germany. In 1911, Canada rejected by popular vote a plan of reciprocity proposed by the United States. Generally speaking, the political party favoring a high protective tariff is opposed to reciprocity. See TARIFF.

RECLAMA'TION SERVICE, a bureau in the United States Department of the Interior which supervises the reclamation of arid and semi-arid lands in the western part of the country, by means of irrigation. The Service was organized by an act of Congress

STATE	PROJECT	AREA*	COST†
Arizona	Salt River	219,691	$14,440,874
Arizona-California	Yuma	127,427	9,051,466
California	Orland	20,533	1,011,345
Colorado	Grand Valley	53,000	3,083,093
	Uncompahgre Valley	100,000	6,794,158
Idaho	Boise	277,366	12,487,390
	King Hill	16,000	4,183
	Minidoka	120,800	5,785,028
Idaho-Wyoming	Jackson Lake	.....	758,756
Kansas	Garden City	10,677	385,467
Montana	Huntley	32,986	1,593,001
	Milk River	220,000	5,221,197
	Sun River	173,945	3,259,587
	Blackfeet	122,500	1,002,378
	Flathead	152,000	2,561,551
	Fort Peck	152,000	546,501
Montana-North Dakota	Lower Yellowstone	60,116	2,898,268
Nebraska-Wyoming	North Platte	229,891	8,069,893
Nevada	Truckee-Carson	206,000	6,035,832
New Mexico	Carlsbad	24,775	1,253,580
	Hondo	10,000	381,621
New Mexico-Texas	Rio Grande	155,000	7,206,914
North Dakota	North Dakota pumping	26,273	739,880
Oklahoma	Lawton	2,500	13,646
Oregon	Umatilla	36,300	2,345,226
Oregon-California	Klamath	142,796	2,860,962
South Dakota	Belle Fourche	97,916	3,456,560
Utah	Strawberry Valley	50,000	3,384,529
Washington	Okanogan	10,099	843,243
	Yakima—Storage unit	.....	2,873,595
	Sunnyside unit	110,828	3,151,491
	Tieton unit	34,000	3,200,274
Wyoming	Shoshone	147,326	4,996,872
Totals		3,142,745	121,698,361

*Estimated on completion. †Gross cost.

approved June 17, 1902, and a fund was created from moneys received from the sale of public lands. As lands placed under irrigation are sold, the sums received therefor are added to the fund, which is thus constantly being renewed. The table on page 3033 shows the extent of operations of the Service to the end of June 30, 1917. The projects named are either completed or will be finished by 1920 or 1921.

How the Land is Obtained. Reclaimed lands are open to settlers under the Homestead Act in tracts of 160 acres or less. After occupying the land for ten years each settler is required to pay in ten yearly installments that part of the cost of constructing the project assessed against his land.

Owners of private lands are allowed to take water from the government ditches on the same terms as settlers on the government lands, with the exception that this privilege is restricted to service for 160 acres, to prevent monopoly.

Water Power. Water from the reservoirs may be used for power as well as for irrigation. It is estimated that the available power in the projects completed or under construction in 1919 exceeded 1,954,000 horse power. The income from power rentals at the Salt River Project alone exceeds $300,000 a year.

Extent of the Service. The Reclamation Service maintains a force of about 6,500 persons, and its annual expenditures approximate $8,000,000. One division of the Service is devoted to securing settlers upon the lands placed under irrigation. With rare exceptions settlers upon irrigated lands are prosperous and contented. See IRRIGATION; CONSERVATION.

RECONSTRUCTION, *re kon struk'shun,* the process by which the states that seceded from the American Union in 1860-1861 were restored to their natural relation with the other states. President Lincoln held the theory that the act of rebellion in each state was not the act of the state, but of disloyal conspirators within the state. The states therefore were still members of the Union, and could be restored to normal relations with it by the creation of loyal state governments. He also considered this restoration of loyal state governments to be an executive rather than a legislative act, because the power of pardon rested with the President only. The theory held by the leading party in Congress was, that by the act of secession these states were deprived of all civil government, and that they existed as disorganized districts subject to the authority of the United States, to be expressed by Congress. A bill embodying this theory was passed in July, 1864. It was vetoed by the President and was not repassed.

Lincoln appointed military governors for Louisiana, Arkansas and Tennessee, and they proceeded to establish loyal governments in their respective states, but their representatives were denied admission to Congress. He proclaimed pardon to all who would take an oath to support the Constitution of the United States, with the exclusion of certain persons who had held office under the Confederacy.

Just at this critical time Lincoln was assassinated. His successor, Andrew Johnson, was capable, but was without tact. He continued Lincoln's policy, issued a proclamation of amnesty and pardon, and established loyal governments in North Carolina, Mississippi, Georgia, Alabama, South Carolina and Florida. Johnson's tactless disregard of Congress brought about a strife between him and that body which reached its climax in his impeachment. He was, however, acquitted.

Meantime Congress enacted drastic laws for the reconstruction of the Southern states. These laws extended the right of suffrage to the negroes, divided the South into five military districts and placed each under the command of a major-general of the United States army. The negroes proceeded to legislate for their states, a task for which they were in no wise prepared. Unscrupulous politicians from the North, called *carpetbaggers* because it was alleged that they could carry all their personal effects in the carpetbag valises they carried, organized the negroes in their own interests. These measures resulted in a period of waste, extravagance and misrule far worse than was predicted by the most strenuous opponents of this plan of reconstruction. Gradually public sentiment in the North changed and saner views prevailed.

During Grant's administration conditions became much better, and all the states were restored in 1870. In 1872 Congress passed an amnesty act removing all disqualifications from ex-Confederates. Early in his administration President Hayes ordered the Federal troops removed from the Southern states, and the period of reconstruction was brought to an end.

RECTANGLE, a plane figure whose angles are right angles and whose opposite sides are parallel. A rectangle whose sides are equal is a *square*. The area of a rectangle is equal to the product of its length by its breadth expressed in square units. If the area of a rectangle and the length of one side are given, the length of the other side may be found by dividing the area by the given dimension.

Illustration. The area of a rectangle 25 feet long and 15 feet wide is equal to 25×15 or 375 square feet.

Conversely. A rectangle has an area of 325 square feet and one of its dimensions is 25 feet. What is the other? $375 \div 25 = 15$, length of the other dimension. See ARITHMETIC; MENSURATION.

RED, one of the primary colors, the color of that part of the spectrum which is farthest from the violet. The red rays are the least refrangible of all the rays of light (see LIGHT, subhead *Spectrum*). Red pigments or coloring matters include vermilion, realgar, cochineal, lakes and madders, coal-tar colors and other substances. By varying the intensity of the color, numerous shades of red can be produced. Because it is the color of blood, red is associated with anger and other violent passions. It forms one of the national colors of England and of the United States. The red flag has been universally adopted as the emblem of the world's radical societies, which aim at the destruction of existing order. In the United States this flag is used by the anarchists. Red is one of the colors used in three-color and four-color printing. See PRINTING, subhead *Color Printing*.

RED'BIRD, the popular name of several birds in the United States. See CARDINAL BIRD; BALTIMORE ORIOLE.

RED CEDAR, a species of juniper which grows in North America and the West Indies. See JUNIPER; CEDAR.

RED CLOUD (about 1825–1909), a famous Sioux Indian chief who was associated with Sitting Bull in Black Hills warfare between 1863 and 1868. He was also active with the Crow and Blackfoot tribes against the whites, and his enmity was particularly emphasized when the Sioux surrendered large areas to the government. He boasted of over eighty separate deeds of valor in fighting the white men. After making peace Red Cloud represented his people on numerous occasions in Washington. He was succeeded in his tribal post by his son, Jack Red Cloud.

RED CROSS SOCIETIES, a name applied generally to those societies maintained in various parts of the world for the purpose of relieving distress in time of war, flood, earthquake and similar disasters. The first Red Cross organizations were formed immediately after the Geneva Convention of 1863, and their original object was to assist the wounded in time of war. Later their activities expanded until they covered the present wide field of humanitarian work. Each national society bears its special name, as American Red Cross, French Red Cross, etc., but all national organizations have a bond of union in the International Committee for the Relief of the Wounded in War. This committee has its headquarters at Geneva, Switzerland. More than forty nations now have agreed to the principles of the Red Cross movement.

The distinctive badge of the societies is a red Maltese cross, on a white ground. In whatever form this badge is seen, as an emblem on the uniform of the Red Cross nurse, a design on an ambulance or a flag floating above a hospital, it is a symbol of neutrality and mercy, and commands the respect of all belligerents.

The American Red Cross. The existing society maintained by the United States was incorporated by act of Congress in 1905, but an organization had been perfected by Clara Barton in 1881 (see BARTON, CLARA). By the law of 1905 the original society was dissolved. The President of the United States is president of the American Red Cross, but the actual administration of affairs is under the control of a committee, the chairman of which is appointed by the President. A strict accounting of all money expended must be made.

During the World War the activities of the society were vastly multiplied, especially after America became a belligerent. During the conflict, two great war funds were oversubscribed, amounting to $115,000,000 and $176,000,000, respectively, and over $24,000,000 was collected from membership dues. The local chapters, through their workrooms, produced garments for refugees,

hospital supplies and garments, knitted articles and surgical dressings having a total value of about $44,000,000. When the armistice was signed in November, 1918, the society had an enrollment of over 20,648,000, besides 8,000,000 members of the Junior Red Cross. The work was almost unlimited in scope. Canteens were established in the United States for the benefit of home soldiers; overseas, refugees were cared for, prisoners in enemy war camps were provided with food and other necessities, and the people of occupied allied countries were saved from starvation and despair. The work of caring for sick and wounded soldiers was in itself stupendous. The heroism of the Red Cross nurses and doctors in the greatest crisis in the world's history can never be overrated.

RED JACKET (1751-1830), a Seneca Indian chief, whose real name was Sagoyewatha. His English name was given him because of his great pride in a jacket given him by an English officer. During the Revolution he was a friend of the British, and later opposed every treaty for the cession of Indian lands to the United States government. During the War of 1812, however, he assisted the United States troops.

REDLANDS, Calif., in San Bernardino County, eight miles southeast of San Bernardino, on the Southern Pacific and the Santa Fe railroads. The city is in the midst of a beautiful and fertile region which raises an abundance of fruit. It is probably the greatest orange-shipping town in the world, over 5,000 boxes being sent from there annually. There are canning and packing industries and wineries, and an important trade in raisins, lumber and fire clay products. There is a library and a hospital. Population, 1910, 10,449; in 1917, 14,573 (Federal estimate).

RED MEN, Improved Order of, a secret benevolent fraternity whose history may be traced to a secret revolutionary society organized in Maryland ten years before the outbreak of the Revolutionary War. This society was called the Sons of Liberty. In 1813 the existing organization took the name Society of Red Men, but it became extinct in 1830. In 1833-1834 the present Improved Order of Red Men was organized at Baltimore, Md. Its motto is "Freedom, Friendship and Charity." Local lodges, or tribes, are found in every state in the Union, in the Canal Zone, Hawaii and the Philippines, and the total membership is nearly 500,000. Women relatives of members are eligible to membership in a branch known as the Degree of Pocahontas, to which men also may belong. The order makes use of legends, expressions and customs of the North American Indians, and meetings are held in "wigwams." The lighting of a council fire calls a meeting to order, and quenching the fire signifies adjournment.

REDMOND, John Edward (1851–1918), an Irish parliamentary leader, born at Waterford. He was educated at the Jesuit College of Clongowes and at Trinity College, Dublin. Subsequently he studied law and was called to the bar. In the House of Commons he represented New Ross from 1881 to 1885; North Wexford from the latter date until 1891, and subsequently sat for Waterford; meantime, he became prominent in Home Rule propaganda. When the Irish Nationalists split at the time of the Parnell scandal, Redmond took the side of Parnell, and on the death of the latter he became the leader of the Parnellites; but in 1900 when the two opposing sides joined to form a new Nationalist party, he succeeded Dillon as leader of the Irish contingent, and he labored unremittingly for Home Rule until the passage of the Home Rule Bill in 1914. In 1915 Redmond was offered a place in Asquith's coalition Cabinet, formed for the more vigorous prosecution of the war, but he declined. Until his death, however, he placed the weight of his influence on the allied side.

RED RIVER, the southernmost of the great tributaries of the Mississippi. It rises in Northern Texas and has several tributaries, the chief, besides the main stream, being the North and South forks, which unite with it on the boundary of Texas. The stream then flows east-southeast, forming the boundary between Texas and Oklahoma, cuts off a corner of Arkansas, flows through Louisiana and falls into the Mississippi. Its other tributaries are the Wichita and the False Wichita. Its middle course is through a dense forest and the remainder is through fertile prairies. The Red River is about 1,200 miles long. During high water it is navigable to the Texas boundary, and boats of light draught ascend the stream as far as Shreveport, 360 miles, throughout the year. A portion of its waters reach the Gulf of Mexico through Atchafalaya Bayou.

RED RIVER OF THE NORTH, an important river of the Saskatchewan-Nelson sys-

tem. It rises in the west-central part of Minnesota, not far from the source of the Mississippi, flows southwesterly, then northerly, into Manitoba, where it empties into Lake Winnipeg. At Wahpeton, N. D., it is joined by the Bois de Sioux, which rises in Lake Traverse, and the two streams form the boundary between Minnesota and North Dakota. Its important tributaries are the Sheyenne and the Pembina in North Dakota, and the Assiniboine, which joins it at Winnipeg. Its length is about 700 miles, and it is navigable as far as Grand Forks, but it is now but little used for transportation purposes.

The basin of the Red River of the North has an area of 63,400 square miles, a large part of which is the bed of the ancient Lake Agassiz (which see), and constitutes one of the most important wheat-growing regions in the world. See WHEAT; also the articles MINNESOTA; MANITOBA.

RED RIVER REBELLION, *re bel'yun*, an uprising in 1870 against the Canadian Government by Indians and half-breeds, or métis, living in the Red River Valley in Manitoba. Previous to 1870 the métis had been under the government of the Hudson's Bay Company, who allowed them to live as they pleased, without securing titles to their land. In 1869 the Hudson's Bay Company transferred to the British government its claim to the vast territory extending inland from Hudson Bay. The following year the British government transferred the title to the Dominion of Canada, and a government survey was ordered. The métis naturally feared that they would lose their land; moreover, the excitement caused by the survey was increased by news that Hon. William McDougall had been appointed governor of the territory.

Under the leadership of Louis Riel a provisional government was organized. Riel took possession of Fort Garry, now Winnipeg, and ordered McDougall not to enter the territory. McDougall, seeing that the half-breeds had just cause for complaint, heeded Riel's order, and affairs would have been easily adjusted had not Riel ordered the execution of a young man, Thomas Scott. This act aroused such indignation throughout Canada that Colonel Garnet Wolseley with a force of 700 men was sent to put down the rebellion. Riel fled to the United States. The half-breeds were pacified when given 240 acres of land each, and the rebellion came to an end. See RIEL, LOUIS.

RED SEA, an arm of the Indian Ocean and an important waterway between Europe and Asia, lying between the Arabian Peninsula and Northeastern Africa. Its length is 1,200 miles and its greatest breadth is 200 miles. It is connected with the Indian Ocean by the Strait of Bab-el-Mandeb and the Gulf of Aden, and with the Mediterranean Sea by the Suez Canal. At the northern end it divides into two branches, the Gulf of Akabah extending into Arabia, and the Gulf of Suez, between Arabia and Egypt. The Sinai Peninsula, famous as the land where the Israelites wandered for forty years, lies between these gulfs.

The Red Sea is a great crack in the rocks into which the water flowed from the Indian Ocean. The mean temperature of the water is 77° in the north, 80° in the middle and 84° in the south. Coral reefs extend along the shores, rendering the sea dangerous to navigators, except in the middle channel, which has a depth of 2,000 to 3,000 feet. The shores are barren, and there are but few harbors. On the east are mountains and tablelands varying in altitude from 3,000 to 6,000 feet, but the western shore is low.

Since the construction of the Suez Canal the importance of the Red Sea as a water highway is almost beyond estimate. Before the opening of this canal, traffic between Europe and the Orient was over long caravan routes, or around the Cape of Good Hope. The Phoenicians and Jews carried on an extensive commerce on this sea at the time of their greatest prosperity. The origin of the name is unknown. Edom, a country to the northeast, may have suggested the name, as *Edom* is the Hebrew word for red. See SUEZ CANAL.

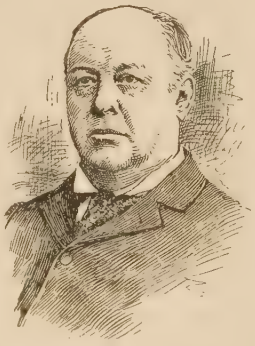
RED'START, one of the most charming of the American warblers. The prevailing color is black, but the wings, sides and tail at the base are a bright orange-red, and the lower parts are mainly white. Its beautiful color, sprightly habits and sweet song make the redstart a general favorite throughout the United States and Canada, where it spends the summer. It hops about from limb to limb in search of insects, and, in its flight darts upward, downward and sidewise, frequently rolling over and over like a leaf blown by the wind; yet these seemingly careless movements are for a purpose, for the bird is in pursuit of insects which it catches with great skill. The nest is built in a bush

or shrub from ten to fifteen feet from the ground, and contains four or five bluish-white eggs spotted with lilac and dark brown. There are a number of more brilliant species inhabiting the South. In Cuba the redstart is called *candelita,* a Spanish name meaning *the little torch.*

RED'WING, Minn., the county seat of Goodhue County, forty miles southeast of Saint Paul, on the Mississippi River, at the head of Lake Pepin, and on the Chicago Great Western and the Chicago, Milwaukee & Saint Paul railroads. The city is in a productive agricultural region, containing deposits of fire clay, and there are potteries and sewer-pipe works; other manufactures are furniture and lumber products. The city contains Red Wing Seminary, Lutheran Ladies' Seminary, a state training school for delinquent youths, two hospitals, Selden Memorial Auditorium and the Carnegie-Lawther Library. The place was settled in 1853, and the city was chartered in 1864. Population, 1910, 9,048; in 1917, 10,158 (Federal estimate).

RED'WOOD, a large tree of the cypress family, found on the western slope of the Coast ranges in Northern California and in Oregon. The redwoods are a species of sequoia, and are described under that heading.

REED, Thomas Brackett (1839–1902), an American statesman, born at Portland, Maine, and educated at Bowdoin College. He studied law and practiced for a time in Portland, served a year in the navy during the Civil War as acting assistant paymaster, then returned to his practice and was elected to the Maine legislature. He began twenty-two years of continuous service in Congress in 1877 and was chosen speaker three times.



THOMAS B. REED

In the fifty-first Congress (1890), Mr. Reed practically destroyed filibustering by ruling that those members who were actually present but refused to vote, in order to prevent a quorum, should be counted. This precipitated a fierce parliamentary battle in the House and earned him the title of "Czar" Reed, but the Supreme Court sustained his decision. In 1896 Reed was an unsuccessful candidate for the Republican nomination for President. He resigned from Congress in 1899 and practiced law in New York until his death.

REFEREN'DUM, the practice of referring proposed laws to the voters for approval or rejection. The referendum may be obligatory or optional. It is obligatory when the constitution requires the legislature of a state to submit all laws passed by that body to the voters for approval. It is optional when its application is left to the legislature or when a petition signed by a given percentage of voters is necessary to secure the submission of any measure to a vote of the people.

The referendum policy is fully developed in Switzerland, where all the cantons use it in some form. In the United States, the principle has always been in force in regard to the adoption or amendment of the state or Federal constitutions, but it is only since 1902 that it has been applied to other laws. In that year Oregon adopted the initiative and the referendum for all laws. The constitution of South Dakota had been amended in 1897 to permit use of the initiative and referendum, but no referendum took place for many years. Since 1902 many other states and hundreds of municipalities have made the referendum a part of their law-making processes. See Initiative.

REFLECTION. See Light, subhead *Reflection of Light.*

REFLEX ACTION, an involuntary or unconscious movement caused by the communication of a sensory with a motor nerve through a nerve center. When the outer extremity of the sensory nerve is stimulated, the impulse is reflected back through the nerve cell along the motor nerve, causing action of the organ to which that nerve extends. All reflex actions are more or less complex and involve several nerves and often a number of nerve centers.

There are many illustrations of involuntary reflex action in ordinary life. The person sleeping will brush a fly from the face without awakening. If one steps upon a tack or other sharp object with the bare foot, the foot is withdrawn without any act of will and before the sensation has reached the brain. Reflex actions also occur through sight and hearing and have a similar effect upon the voluntary muscles, though it is usually general instead of local. One walking through the grass may be caused to jump by the sudden

appearance of some small animal, and one frequently jumps on hearing a sudden sound.

The chief centers for involuntary reflex action are the medulla oblongata and the spinal cord, but smaller centers are located in different parts of the body. Reflex acts of the spinal cord and cranial nerve centers are performed more quickly than voluntary acts, and they frequently preserve the body from injury. The time for a reflex act is from six-hundredths to eight-hundredths of a second.

The term reflex action is also extended to include conscious acts that have become automatic. In fact, from the viewpoint of the physiologist, nearly all acts contain a reflex element. See HABIT; NERVOUS SYSTEM; WILL.

Martin Luther, the Leader

REFORMATION, *re'for-ma'shun,* THE, a term applied to a revolt in Europe in the sixteenth century against papal supremacy and certain doctrinal tenets of the Church of Rome. For many centuries, western Europe had been a religious unit, under the primacy of the Pope, the Papal power being at one time almost absolute in temporal as well as in spiritual matters. As early as the fourteenth century, several of the princes and sovereigns of Europe refused the Pope the right to dictate in temporal or governmental affairs, but previous to the opening of the sixteenth century there had been comparatively few who denied the supreme and infallible authority of the Pope in matters touching religion. Among these few were Wycliffe, Huss and Jerome.

Causes. The causes leading to the sixteenth century reformation were many. The great intellectual awakening known as the Renaissance, or revival of learning, increased the number of scholars. The invention of printing scattered written works broadcast over Europe—not only the Bible, but the writings of men who had begun to doubt the scriptural authority for some of the doctrines and ceremonies of the Church, such as devotion to the Virgin Mary, the invoking of saints, confession to a priest, and the nature of the elements used in the sacrament of the Lord's Supper. These writings, of course, led to questionings and criticism. In addition to these fundamental causes there was the need of a thorough reform within the Church itself—a need recognized by all earnest and spiritual-minded men, the only difference of opinion being the manner in which the work of purification should be effected. A fourth cause may be found in the feeling of jealousy with which the temporal princes regarded the Papal power.

Progress. The actual occasion of the outbreak of the Reformation, however, was the sale of indulgences in Germany. It has always been a tenet of the Catholic Church that indulgences remit penalties due to sin after severe repentance and aid of the sacrament of penance. Leo X, in 1513, desirous of completing the great temple of Saint Peter's, which Julius II had commenced, granted an indulgence to those who would contribute financial aid for the purpose. Johann Tetzel, to whom the archbishop of Magdeburg had delegated the power of dispensing indulgences in Saxony, carried out his commission in such a manner that wrong ideas about the effect of indulgences began to spread among the ignorant and credulous. Many intelligent Christians likewise opposed his methods.

Martin Luther, an Augustinian monk and teacher of theology in the University of Wittenberg, was foremost among those who denounced Tetzel. He appeared in the vicinity of Wittenberg at the time of the celebration of a yearly festival, when it was customary to post on the church doors bulletins of general interest to the parish, and nailed to the door ninety-five theses, warning the people against such persons as Tetzel and emphasizing the necessity of a penitent heart and a loving spirit in making gifts to the Church. Copies of these theses were scattered broadcast, and all the continent was soon plunged into a tumult of controversy. Luther, meanwhile, devoted himself to continued study of the Bible, Church history and canon law, in order to defend the position he had taken, and he drifted farther and farther from the Church. His public utterances and writings became bolder, and he soon began attacking the Church of Rome. He maintained that contrition, confession and absolution were not necessary to secure salvation, denied the infallibility of the councils of the Church, and asserted that the Bible was the only foundation of faith and that bishops, priests and formal worship were wholly unnecessary. Ow-

ing to his wide reputation for learning and piety, his opinions on these subjects influenced a great many people.

At first, Pope Adrian VI did not regard the matter as of serious import; but when convinced that Luther's influence was becoming dangerous, he urged the Diet of Nüremberg to institute determined action against him. The Diet, however, felt powerless to carry out the desire of the Pope, because of Luther's popularity with a number of the German princes. Frederick the Elector became his great patron. However, Luther's writings were condemned as heretical, and if he did not recant his errors in sixty days, he was to be seized and sent to Rome to be tried for heresy. Luther publicly burned the Pope's bull, to the general amazement of the people.

In 1521 Luther was summoned by Charles V to appear before the Diet of Worms and was called upon to recant his errors. Refusing to do so, he was conveyed privately to the Wartburg Castle by Frederick, elector of Saxony, where he lived in seclusion for a time and busied himself with the translation of the New Testament into German.

Alliances and Diets. On May 4, 1526, an alliance of the Protestant princes was formed at Torgau, under the leadership of John, elector of Saxony, and Philip, landgrave of Hesse. The Catholics formed a counter-alliance at Dessau, which emphasized a disunion that was destined to exercise an influence in every part of the world. The followers of Luther having become so numerous, Philip of Hesse convened a synod at Homburg in October, 1526, to systematize the doctrines and establish a rule of faith. A constitution was there formed which gave an individual congregation power to decide its own ecclesiastical rules. This was adopted in the several Lutheran states, in each of which the chief, or head, of the government was to be supreme in relation to the Church. To educate the younger element of the people, Luther wrote a catechism of a doctrinal character, which was extensively circulated. Because of a dread of Turkish power and a desire to allay, if possible, the dissensions which had arisen in relation to questions of an ecclesiastical character, a diet was held on April 19, 1529, at Spires. The Catholics submitted what they regarded as moderate claims. Against them the Lutherans protested, which was the origin of the name *Protestant,* that has since been applied to Lutherans and other dissenters from the doctrines of the Roman Church.

In June, 1530, a diet was held at Augsburg, at which Emperor Charles V presided. It demanded from the Protestant princes a written confession of faith. A confession, written by Melanchthon and approved by Luther, has since been known as the "Augsburg Confession." In 1555, in a diet at Augsburg, articles were framed giving each prince the right to choose between Lutheranism and Catholicism, the religion of the prince to be that of his people. Any prelate on becoming Protestant was to give up his benefice, and the subjects of ecclesiastical princes were to enjoy religious liberty. Thus the Lutherans first received legal recognition, but the issues between Catholics and Protestants were never satisfactorily adjusted until the Peace of Westphalia, which ended the Thirty Years' War, in 1648.

The doctrines of the German reformer found a willing adherent in Gustavus Vasa, who in 1523 became king of Sweden. Gustavus induced the estates of the realm, in the Diet of Westeräs (1527), to sanction the confiscation of the monasteries, and he declared himself supreme in matters ecclesiastical. The last remains of Catholic usages were abolished at a second Diet of Westeräs in 1544.

Denmark. The first systematic measures in favor of the Reformation in Denmark were taken by Frederick I, through the influence of his son Christian, who had studied in Germany and become an enthusiastic Lutheran. At a diet held in 1539, at which no member of the clergy was allowed to be present, the assembly decreed the abolition of the Roman Catholic worship in the Danish dominions.

Hungary and Poland. In Hungary, where numerous Germans had settled, bringing Lutheranism with them, the new faith for a short time made rapid progress, especially in the cities and among the nobles. In Poland the Reformation also found numerous adherents, but eventually the old faith dominated.

Italy and Spain. Both in Italy and in Spain, the idea of the Reformation at first gained some ground among scholars, but it never appealed to the masses of the people, and even among the scholars who were foremost in advocating certain reforms in the Church there was never any sympathy with the revolt against the Papacy. After the

Council of Trent and the subsequent Catholic Reformation, Protestantism practically disappeared from Southern Europe.

Swiss States. In the Swiss states, the progress of Protestantism was of much more importance. It found a leader in Ulrich Zwingli, a preacher at Zürich, who, by sermons, pamphlets and public discussions, induced that city to abolish the old and inaugurate a new Reformed Church, a course followed by Berne and other cities. Ultimately this movement was merged in political dissensions between the Reformed and the Roman Catholic cantons, and Zwingli himself fell in battle (1531). Between Luther and Zwingli there were differences of opinion, chiefly concerning the Lord's Supper, in which the former showed considerable ill-nature toward his fellow reformers. *The Institutes of Calvin* formulated the doctrines of a large body of Swiss Reformers, who also accepted Calvin's ordinances regarding Church discipline. After many tedious contests, Calvin's creed was virtually accepted in the Netherlands and elsewhere.

France. In France the movement seemed at first to find powerful support, as Margaret, queen of Navarre, sister of King Francis I, and many of the higher ecclesiastics favored the reformed doctrine. The New Testament was translated into French, churches to the number of 2,000 were established by 1558, and the Huguenots, as the Protestants were called, formed a large religious party in the State. Unhappily, however, the religious element was mixed with political and personal hatreds, and in the civil strifes before and after the Massacre of Saint Bartholomew (1572) the religious movement declined. The giving up of Protestantism by Henry IV (1593) was a blow to the Huguenots, and though they obtained toleration and certain privileges by the Edict of Nantes, this was finally revoked in 1685.

England. The Reformation in England was only indirectly connected with the reform movement in Germany. Wycliffe and the Lollards, the revival of learning, the writings of More, Colet and Erasmus, the martyrdom of Thomas Bilney, had all combined to render the doctrine and discipline of the Church unpopular. This feeling was greatly increased when the writings of Luther and Tyndale's translation of the Bible found eager readers. The political element came to favor the popular reform movement when Henry VIII, in his efforts to obtain a divorce from Catharine, found it necessary to repudiate the Papal supremacy and declare himself by act of Parliament (1534) the supreme head of the Church of England. To this the Pope replied by threats of excommunication, which were not, however, immediately executed; yet the breach with Rome was complete, so far at least as the king was concerned. Under the new laws of supremacy and reason, several of the clergy suffered at Tyburn. Sir Thomas More and Fisher, bishop of Rochester, were beheaded at Tower Hill, and the lesser and greater monasteries were suppressed.

At this time there were three chief parties in the State: the party which still held the Pope to be the supreme head of the Church; the king's party, which rejected Papal authority but retained the Roman Catholic faith; and the reform party, which rejected both the authority and the doctrine of the Roman Church. So far as Henry VIII himself was concerned, the changes made were not due to religious convictions, for in 1539 we find him passing the statute known as the *Six Articles,* which rendered it a penal offense to deny the doctrine of trans-substantiation or to affirm that priests might marry, yet he allowed the publication of the *Litany* and some forms of prayer in English.

With the accession of Edward VI, the Reformation movement made considerable progress. In 1549 the First Act of Uniformity enjoined on the Church the use of Cranmer's *First Book of Common Prayer,* and in 1551 the faith of the reformers was summed up in the *Forty-two Articles of Religion,* which in the reign of Elizabeth were reduced to the *Thirty-nine Articles of the Church of England.* They deny purgatory, reduce the original seven sacraments to two, endorse the Lutheran doctrine of justification by faith alone, repudiate Papal jurisdiction and constitute the sovereign the supreme head of the Church. Thus, England in religion became detached from the see of Rome.

Scotland. In Scotland the first great Protestant reformer was Patrick Hamilton, after whose death, in 1528, George Wishart took up the work and was followed by John Knox, who finally became the leading spirit of the Reformation in Scotland. By 1560 the new faith was firmly established in the country, episcopacy was abolished and the Reformed Church set up, differing in every respect as greatly as possible from the Church of Rome.

The doctrines of the Church were formulated by Knox in a creed known as the *First Book of Discipline,* which was adopted by the General Assembly of the Church.

Results of Reformation. Thus Protestantism, the ultimate expression of the Reformation, took root permanently only in Northern Europe, while Latin Europe, Italy, Spain, France and Austria, remained essentially Catholic countries. The effect of the Reformation in the Roman Catholic Church itself was on the whole good, for it compelled its attention to acknowledged abuses which greater vigilance and a more perfect supervision have now removed.

Related Articles. Consult the following titles for additional information:

Augsburg Confession	Melanchthon, Philip
Bull	Nantes, Edict of
Calvin and Calvinism	Peasants' War
Charles V	Pope
Eck, Johann M.	Protestants
England, Church of	Renaissance
Erasmus, Desiderius	Roman Catholic Church
Huguenots	Thirty Years' War
Huss, John	Wycliffe, John
Indulgence	Zwingli, Ulric
Knox, John	
Luther, Martin	

REFORMED CHURCH, in general, those churches which arose at the time of the Reformation; specifically, Protestant churches which did not embrace the doctrines and discipline of Luther. The title was first assumed by the French Protestants, but afterward it became the common designation of all the Calvinistic churches on the European continent. In America there are four Protestant denominations which use the name Reformed. These are the Dutch Reformed, the German Reformed, the Christian Reformed and the Hungarian Reformed. Their combined membership is about 464,000.

REFORM SCHOOLS. In many countries, instead of imprisoning boys and girls arrested for misdemeanor, the state places them in institutions where they may have moral guidance and an opportunity to reform and fit themselves for lives of usefulness. Such state institutions are known as reform schools. What to do with juvenile delinquents came to be a serious problem for reformers early in the nineteenth century, and as early as 1824 the House of Refuge on Randall's Island, New York, was established as a private institution. This was followed by other similar schools, and in 1876 the first state reform school was founded, at Elmira, N. Y. This institution won worldwide attention, and soon led to the establishment of others.

The fundamental idea of all reform schools is not to punish, but to reform, the offender; to promote his physical and mental development and to give him such industrial training as will enable him to support himself after his release. In the beginning of the movement only adolescent boys and girls—about fifteen or sixteen years old—were taken into the reform schools; to-day provision is made for young women and young men up to the age of thirty. Thanks to the indeterminate sentence, the young man or young woman who, through diligence and good behavior, is promoted to the highest grade, is released on parole and given an opportunity to make good in the world. It is said that eighty per cent of those who are thus released afterwards lead upright lives.

REFRAC'TION. If a stick is thrust into water it appears to be bent at the surface of the water (see illustration, article LIGHT). A spoon placed in a cup of clear tea presents a similar appearance. These appearances illustrate the principle of refraction of light. The rays in passing from air into water are entering a denser medium, and are bent out of their straight course, or refracted. The eye follows the course of the bent ray and seems to see a crooked stick or spoon. The law of refraction is as follows: Light passing from a rare to a dense medium is bent towards a line perpendicular to the surface of the refracting body. Light passing from a dense to a rare medium is bent from a perpendicular to the surface of the refracting body. Only when a ray travels through a uniform medium does it follow a straight path.

Among the common phenomena due to refraction are the apparent shallowness of a vessel when filled with water, the magnifying power of lenses, the rainbow and the beautiful rainbow tints on the horizon at sunrise and sunset. Since the lower layers of the atmosphere are more dense than the upper layers, rays of light passing horizontally through the atmosphere are bent downward, and, since we see the object in the direction of the refracted ray, we see the setting sun after it is below, and the rising sun before it is above, the horizon.

Related Articles. Consult the following titles for additional information:

Light	Polarization of Light
Mirage	Rainbow

REFRIGERATION, *re frij er a'shun.* See COLD STORAGE.

REGELATION, *rej e la'tion.* When two blocks of moist ice are brought into contact under pressure they will freeze together, though the temperature is above the melting point. This occurs not only in the air but also in water having a temperature as high as 100° F. The term *regelation,* meaning *refreezing,* is applied to this phenomenon, for which the following explanation is usually advanced: The ice melts at the plane of contact, and the water formed freezes when the pressure is relieved. Thus the two pieces are welded together. That the melting point is lowered as the pressure increases is a well-known law of physics. The theory of regelation is considered of value in explaining the formation of glaciers. See GLACIER.

REGENT, *re'jent,* in a broad sense, a person who governs; specifically, one who governs during the minority, absence or disability of a king or queen. In most countries where the ruling power is hereditary the duties of regent usually devolve upon the nearest relative of the sovereign who is capable of undertaking them. In the English universities the term *regent* is given to a member of the governing body of the institution. In many states of the United States and Canadian provinces the term is applied to officers having the direction of state or provincial colleges and universities.

REGIMENT, *rej'i ment,* a body of regular soldiers forming an administrative unit of an army. The size of the regiment depends upon the class of troops forming it. For instance, a regiment of cavalry is not usually as large as one of infantry. Since the regiment of infantry is the standard for organization, a description of that will give a good idea of the organization of all. In the armies of Great Britain, France and Germany, at the beginning of the World War, a regiment of infantry numbered about 3,000 soldiers, besides officers. The regiment was divided into battalions of about 1,000 men, each battalion including four companies. The regiment is commanded by a colonel, and the battalion by a lieutenant-colonel. The companies are commanded by captains. For the United States army, see ARMY, subhead, *Units of Army Organization.*

REGINA, *re ji'na,* SASK., fourteenth city in size in Canada, capital of the province, on the Canadian Pacific, the Grand Trunk Pacific and the Canadian Northern railways, about 100 miles north of the international boundary. It has large manufacturing establishments, including flour mills, sash and door factories, machine shops, soap works and wire and steel works. The city also has six large grain elevators and is a distributing point for wholesale groceries, hardware, furniture, builders' supplies and machinery of various kinds. Among the city's prominent buildings are the Parliament building, two hospitals, the Y. M. C. A. and Y. W. C. A., the public library and the new Hudson Bay Company's building, estimated to cost $2,000,000. Regina is the headquarters for the Royal Northwest Mounted Police and the provincial courts. Several million dollars' worth of property was destroyed and many lives were lost in the cyclone which devastated the city on July 1, 1912. Population, 1916, 26,105.

REGISTRA'TION. Registration is of two sorts, registration of voters and registration of births, deaths and marriages.

Registration of Voters. Registration of voters is for preventing voting by those who are not legally qualified. In large cities this registration is formal and exacting, and is conducted by the boards of election in the voting precincts. In American communities when a voter registers he is required to give his name and residence, to state how long he has resided at his present place of residence, how long he has resided in the precinct, in the county, in the state and in the United States, and to name the state in which he was born. If he is a naturalized citizen, he may be required to produce his naturalization papers. See ELECTION.

Registration of Births, Deaths, and Marriages. Registration of births, deaths and marriages is required in nearly all countries. Physicans are required to send to the designated authorities records of all births and deaths, and clergymen performing marriage ceremonies are required to send records of these ceremonies. Marriage licenses are also required in most states, and these are recorded when issued. Registration provides a valuable record which is often consulted by courts of law; it furnishes every country with vital statistics, and serves as a check on immorality.

REICHSTADT, *riK'staht,* NAPOLEON FRANÇOIS JOSEPH BONAPARTE, Duke of (known as Napoleon II) (1811–1832), the only son of Napoleon and Empress Maria Louisa. On his abdication, following the

Battle of Waterloo, Napoleon declared the infant prince his successor. The Senate, however, took no notice of Napoleon II, whereupon Maria Louisa took him to the court of his grandfather, Francis I of Austria. By the Treaty of Paris, Napoleon II was barred from inheritance, but was later made the Duke of Reichstadt, with the rank of an Austrian prince. He was never strong, and died of overexertion at the age of twenty-one.

REICHSTAG, *riKes'tahg,* (German *Reich,* a kingdom, and *Tag,* a day), the name of the lower house of the German Parliament as it existed from 1871 to 1918. The members of the Reichstag were elected by popular vote, and all measures had to have their approval to become laws. The upper branch of the legislative body was the Bundesrat (which see). In 1918, when the revolutionary uprising overthrew the imperial régime, these legislative assemblies ceased to exist. See GERMANY.

REID, WHITELAW (1837–1912), an American journalist and diplomat, born at Xenia, Ohio. He graduated at Miami University in 1856, taught school for two years and then entered upon a journalistic career, becoming editor of the *News,* in his native town. During the Civil War he was Washington correspondent of the Cincinnati *Gazette.* In 1868 he became an editorial writer on the staff of the New York *Tribune,* and four years later, upon the death of Horace Greeley, owner of that paper. In 1889 President Harrison appointed him United States minister to France; in 1892 he was the unsuccessful nominee for Vice-President, on the ticket with Harrison. Reid was special ambassador of the United States at Queen Victoria's Jubilee in 1897, was one of the American peace commissioners to Paris in 1898 and his country's representative at the coronation of King Edward VII in 1902. He was appointed by President Roosevelt ambassador to England in 1905.

He published many books and collections of essays and speeches and received honorary degrees from the University of the City of New York, Dartmouth, Miami, Princeton, Yale, Cambridge (England) and Saint Andrews (Scotland).

REIGN OF TERROR. See TERROR, REIGN OF.

REIKJAVIK. See REYKJAVIK.

REINDEER, *rain'deer,* a deer found in the northern parts of Europe and Asia. In North America the family is represented by the *caribou.* The reindeer is about four feet high at the shoulders and has a thick, square body; its legs are shorter, in proportion to its body, than those of the red deer. The size varies somewhat, according to climate, the reindeer of the Arctic regions being larger than those found farther south. The feet are large and broad and enable the animal to travel easily over the snow. The head carries a pair of large, branching antlers, which are shed each year.

The reindeer is one of the most important domestic animals. To the inhabitants of Northern Europe and Siberia it is the beast of burden of the Arctic region. Its flesh furnishes meat, and from its milk cheese is made. In summer the meat is preserved by

REINDEER

drying. The skins furnish material for clothing, and from the antlers and bones numerous utensils are made. The animal is keen of sight and swift of foot and will maintain a speed of nine or ten miles an hour for a long time. It can easily draw a sledge with a weight of 200 pounds. The reindeer lives upon twigs, grass and lichens, which it secures by pushing the snow aside with its nose and fore feet.

When Alaska was opened for settlement and exploitation, white men killed such numbers of caribou and other large game that the Eskimos were threatened with starvation. To remedy this condition in 1892 the United States government, through the Bureau of Education, imported 1,200 reindeer from Siberia, and the Bureau engaged a number of Laplanders to teach the natives how to care for the animals. The experiment succeeded beyond the most sanguine expectations, and

in 1916 there were about 71,000 of these valuable animals in the territory. The income to the natives, exclusive of what they use for themselves, exceeds $82,000 annually. Some of the Aleutian Islands have been set apart by the United States government as reserves for the raising of reindeer, so that the supply of these animals will be adequate to meet the demands of the increase in population in Alaska. See CARIBOU; DEER.

RELA'TIONSHIP. Personal and legal relationships are of two classes: those of blood, that is, the relationship which exists between two persons descended from the same ancestor, known as *consanguinity,* and those of *affinity,* or marriage, that is, the relationship which exists between the husband or wife and the kindred, by blood, of the other. The wife's kindred by blood bear the same relation to the husband by affinity that they bear to her by consanguinity; thus, the wife's sister is said to be the sister-in-law of the husband. Relation by affinity disqualifies judges, jurors or witnesses, equally with relation by consanguinity. In American law the term *relationship* is sometimes employed to include all who under the statutes of distribution are entitled to share in the estate of a deceased person.

RELIEF, *re leef'.* See ALTO-RILIEVO; BAS-RELIEF; MEZZO-RILIEVO.

RELIGION, *re lij' un.* Many definitions of religion have been given, and while none seems to be entirely satisfactory, it is generally agreed that religion treats of man's relation to a supreme power, and his method of expressing that relation in worship.

All men are religious. No tribe has been found so low in savagery or barbarism that it did not acknowledge some relation to a supreme being and in a crude way try to give expression to that relationship. All religions can be classified under two great divisions—those whose followers recognize but one supreme being (monotheistic); those whose followers recognize a number of gods (polytheistic). A more satisfactory classification is that given by Jastrow, who distinguishes four great divisions:

1. The religions of savages.
2. The religions of primitive culture, such as those of the ancient Mexicans and Peruvians, and those of the South Sea Islanders.
3. The religions of advanced culture, such as those of Egypt, Babylonia, Assyria, Greece and Rome.
4. The religions coextensive with life, such as Judaism, Buddhism, Mohammedanism and Christianity.

Religions of the first and second groups are characterized by the worship of objects of nature, such as the heavenly bodies, mountains and streams, and the worship of the spirits of ancestors. Magical rites and ceremonies form an important part in this worship, and the priest is a medium of communication between the gods and man. In religions of the third group, mythology takes the place of magic, and the priesthood begins to guard the morals of the people. Religions of the fourth group, those which are coextensive with life, exert the greatest influence over the individual and over the race. These religions emphasize the spiritual nature in man, and the importance of man's relation to the divine. Their followers are required to follow high ethical standards. The nations in which Christianity is the prevailing religion have exerted the greatest influence over human history.

Great Religions of the World. In the following table are shown the number of followers of the world's principal religions:

RELIGION	NUMBER OF FOLLOWERS
Christianity	564,510,000
Confucianism and Taoism	300,830,000
Hinduism	210,540,000
Mohammedanism	221,825,000
Buddhism	138,031,000
Judaism	13,053,000
Animism	158,270,000
Shintoism	25,000,000
Unclassified	15,280,000

Related Articles. Consult the following titles for additional information:

Abbot
Absolution
Adventists
African Methodist Episcopal Church
Agnosticism
Allah
Alpha and Omega
Amana Society
Anabaptists
Ancestor Worship
Angel
Anglican Church
Antipope
Apostles
Apostolic Succession
Archbishop
Articles, The Thirty-nine
Atheism
Atonement
Ave Maria
Baptism
Baptists
Baptist Young People's Union
Benedictines
Bishop
Brahma
Brahmanism
Breviary
Buddha
Buddhism
Bull
Canon Law
Canonization
Capuchins
Cardinal
Carthusians
Cathedral
Censer
Chaplain
Charity, Sisters of
Christian Endeavor, United Society of
Christianity
Christian Science
Christmas
Church
Conclave
Concordat
Congregationalists
Counter-Reformation
Covenanters
Creed
Cross

Deaconess
Dervish
Devil
Devil Worship
Disciples of Christ
Dominicans
Druids
Dukhobors
Dunkers
Easter
Epiphany
Episcopal Church
Epworth League
Eucharist
Evangelical Alliance
Evangelical Association
Fasts and Fasting
Fatalism
Fire Worship
Foreordination
Franciscans
Free Methodists
Freethinker
Gentiles
Ghebers
God
Greek Church
Hadj
Heaven
Hegira
Hell
Heretic
Hermits
Hierarchy
High Priest
Holy Ghost
Holy Water
Holy Week
Hugenots
Hussites
Idol
Immortality
Indulgence
Islam
Jehovah
Jesuits
Jesus Christ
Jews
Koran
Lamaism
Latter Day Saints
Lent
Litany
Liturgy
Lutherans
Magi
Magnificat
Martyr
Mass
Mendicant Orders
Mennonites
Mercy, Sisters of
Messiah
Methodists
Missal
Missions
Mohammedanism
Monasticism
Monk
Moravian Brethren
Mormons
Mysticism
Nature Worship
Nonconformists
Nun
Nuncio
Pantheism
Parsees
Paulists
Penance
Polytheism
Pope
Predestination
Presbyterians
Priest
Protestant
Purgatory
Quakers
Rabbi
Reformed Church
Religious Liberty
Resurrection
Roman Catholic Church
Rosary
Sacrament
Sacred College
Sacrifices
Salvation Army, The
Seventh Day Adventists
Shakers
Shamanism
Shiites
Shintoism
Sunday Schools
Synagogue
Talmud
Taosim
Theosophy
Trappists
Trinity
Unction
Unitarians
Universalists
Ursulines
Vatican Council
Vicar
Volunteers of America
Wesleyan Methodists
Zionist Movement

RELIGIOUS LEADERS

Blavatsky, Helen P.
Booth (family)
Calvin and Calvinism
Confucius
Eddy, Mary Baker
Fox, George
Huss, John
Hutchinson, Anne
Jesus Christ
Knox, John
Loyola, Saint Ignatius of
Luther, Martin
Melanchthon, Philip
Mohammed
Moody, Dwight Lyman
Savonarola
Smith, Joseph
Sunday, William A.
Swedenborg, Emanuel
Wesley, John
Williams, Roger
Wycliffe, John
Young, Brigham
Zoroaster
Zwingli, Ulric

RELIGIOUS, LIBERTY, *re lij'us*, the right of every one to form his religious opinions and to express them in worship without interference from the state. Among the nations of ancient times the idea of religious liberty was almost totally lacking, the individual being subject to the king in religious as well as in civil matters. During the early centuries of the Christian Era the Christians were frequently persecuted, and not until after the conversion of Emperor Constantine was full toleration of religious worship granted to all persons. In A. D. 313 he published an edict establishing Christianity as the state religion of the Roman Empire.

Previous to the Protestant Reformation the authority of the Roman Catholic Church was almost universally recognized throughout Europe, and the question of religious liberty did not arise. The Reformation did not directly introduce the question, since every ruler, Catholic or Protestant, believed that unity of faith among his subjects was necessary to the integrity of the state. Religious liberty is the outgrowth of the gradual broadening of men's minds through education, travel and perfection of means of communication. It received its first great impetus with the emigration of the Pilgrims to America; the first amendment to the American Constitution provides that Congress shall make no law respecting the establishment of religion. The spirit of tolerance developed in America has exerted a strong influence on other nations, and religious toleration now prevails in all progressive countries.

REMBRANDT, *rem'brant* (1608–1669), whose full name was REMBRANDT HARMENSZ VAN RIJN, was the greatest painter and etcher Holland has produced and one of the supreme masters of all time. He was born at Leyden. At the age of twenty-five he went to Amsterdam, where he spent the rest of his life.

Rembrandt was remarkably prolific and versatile. His subjects include portraits, religious and classical themes and landscapes, and he was equally successful as a painter and as an etcher. As the first real Dutch master of naturalistic portraiture Rembrandt quickly acquired a wealthy and distinguished patronage, and his portraits are valuable not only as supreme works of art, but also as records of his time. He reserved much of his time from this profitable labor and painted numerous portraits of himself and of members of his family, including his beautiful wife, Saskia, to whom he was married in 1634. He also executed scores of other masterpieces, which are now among the chief treasures of the great galleries.

REMBRANDT

His most famous work, *The Night Watch*, a large composition of twenty figures representing the civic guard of his city leaving

their clubhouse, is in the Royal Museum at Amsterdam. In the same museum is *The Syndics of the Drapers,* a lifelike and beautiful group of seventeenth-century Dutch merchants. Among other important canvases are *The Anatomy Lesson,* with its masterly comparative treatment of living and dead human flesh; *The Supper at Emmaüs,* an equally startling study of contrasted qualities, in which the natural and supernatural are shown side by side. The *Old Woman Cutting her Nails, The Auctioneer* and several other important works are owned by the Metropolitan Museum, New York, and a fine *Portrait of a Girl* is prominent in the collection of old masters of the Chicago Art Institute. *The Mill,* perhaps the best of his landscapes in color, belongs to the Widener collection, Philadelphia. In addition to these famous works, Rembrandt painted about 275 other canvases and did 320 etchings; and of these last the most notable are *The Descent from the Cross, Christ Healing the Sick* and *The Burgomaster Jan Six.*

As a master of chiaroscuro (the disposition of light and dark in a picture) Rembrandt has no equal. His figures were faultlessly modeled and full of life; his color rich, transparent and glowing. In all his work there is a vivid realism combined with poetic feeling and grace.

REMINGTON, Frederic (1861–1909), an American sculptor, painter and writer, who vividly portrayed the picturesque life of the Western plains. He was born at Canton, N. Y., and after studying art in New York City, traveled west, where he spent much time living the life of a cowboy and camping with Indians. In time he acquired a unique reputation by writing and illustrating stories of cowboys and red men. In his landscapes are the warm colors of mountain, plain and desert; in his figures the vigor and energy of the sort of men who inhabit such regions. One of his best paintings, *Cavalry Charge on the Southern Plain,* is owned by the Metropolitan Museum, New York. The same museum has his two bronze statuettes, *Bronco Buster* and *Wounded Bunkie.* His books, which he illustrated, are entitled *Pony Tracks, Crooked Trails* and *The Way of an Indian.*

REM'SEN Ira (1846–), an American chemist and educator, born in New York City. He was educated in the College of the City of New York, the College of Physicians and Surgeons and the universities of Munich and Göttingen. At the age of twenty-six he became professor of chemistry and physics in Williams College, at Williamstown, Mass. When Johns Hopkins University was founded in 1876, he was chosen to organize the department of chemistry, which became one of the best, not only in America, but in the world. He was president of that university from 1901 to 1912, when he resigned to resume his research work in chemistry. Dr. Remsen's work has given him a wide reputation, and his books have been translated into several languages. Among his best known books are *Theoretical Chemistry, Organic Chemistry, Introduction to Chemistry* and *The University Movement.*

IRA REMSEN

RENAISSANCE, *ren na sahNs'* a French word meaning *new birth,* is the name given to the movement which produced the change from the methods of study and ideals of the Middle Ages to those of modern times. It is sometimes called the *Revival of Learning,* because there was an intellectual awakening that led to investigation along lines of science and the study of art and literature on a much broader plan than had been followed for two or three centuries.

Previous to the Renaissance the clergy were the only educated class, and they were naturally considered authority on all scholastic matters. With the dawn of the new era men began to think for themselves, and the influx of scholars and books from the East when Constantinople was captured by the Turks (1453) came at the right time to lend assistance to the movement. This influx of Greek literature and scholarship was not, however, the direct cause of the Renaissance, as many have been led to regard it. The Renaissance was an evolution of ideas which had been slowly forming during the century preceding this event. The idea that the Middle Ages were also the *Dark Ages* is erroneous, for during the period was laid the foundation of modern civilization, and much pioneering work was accomplished.

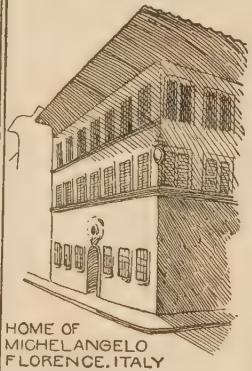
THE RENAISSANCE

The "New Birth:" the Dawn of the Modern Era

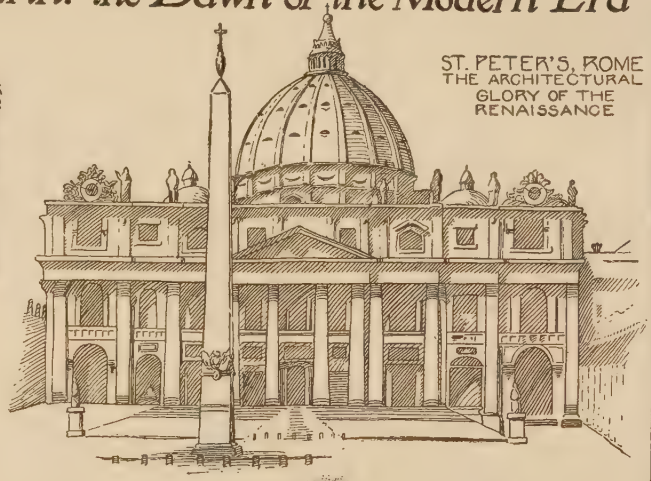
RAPHAEL–1483-1520

COPERNICUS–1473-1543

COLUMBUS – 1446-1506

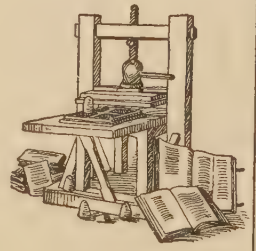


HOME OF MICHELANGELO FLORENCE, ITALY



ST. PETER'S, ROME THE ARCHITECTURAL GLORY OF THE RENAISSANCE

TRADE ROUTES OF THE PERIOD



GUTENBERG'S PRINTING PRESS ABOUT 1450

PETRARCH – 1304-1374

ERASMUS – 1467-1536

GUTENBERG – 1400-1468

The Renaissance cannot be understood unless we recognize the fact that the Middle Ages had a civilization and culture of their own. This culture had been bound by tradition, and the Renaissance removed the bands and accepted the best of the old civilization, as a foundation for the new. The Renaissance did not consist so much in the change of subjects to which men devoted their thought as to the different viewpoint from which these subjects were studied. All subjects were considered in a freer, more inquiring and more critical attitude, and the change gave new meaning to art, literature, philosophy, government and religion. At first wholly theoretical, the New Learning gradually became practical; the spirit of the Renaissance became the spirit of progress.

RENAN, *re nahN',* Ernest (1823–1892), a French philologist, historian and essayist born at Tréguier, in Brittany, and educated for the priesthood at the seminary of Saint Sulpice, Paris. In 1845, however, he gave up all intention of becoming a priest and devoted himself to historical and linguistic studies. In 1862 he was appointed professor of Hebrew in the Collège de France, but his unorthodox views on religion led to his dismissal. In 1863 his *Life of Jesus,* the work by which he is most widely known, appeared. This book gave rise to prolonged discussions throughout Europe. It was the first of a series of volumes setting forth Renan's views on the history and origin of Christianity. The most important of these volumes are *The Apostles, Saint Paul, The Christian Church, The Antichrist* and *Marcus Aurelius.* Renan was highly honored as a scholar by France and its learned societies.

RENFREW, Ont., in Renfrew County, on the Bonnechère River and on the Canadian Pacific and Grand Trunk Pacific railways. The river at this point affords abundant water power and the town contains numerous manufactories, including woolen mills, flour mills, factories producing cream separators, gas engines and truck scales, a tannery, brick and tile factories and one of the largest creameries in the Dominion. Its educational facilities include a good collegiate institute and a separate school. Population, 1916, 6,611.

RENI, *ra'ne,* Guido. See Guido Reni.

RE'NO, Nev., the county seat of Washoe County, thirty-one miles north of Carson City, on the unnavigable Truckee River and the Truckee-Carson Canal, and the Southern Pacific, the Virginia & Truckee and the Nevada, California & Oregon railroads. It is in a farming, mining and stock-raising section, set amid attractive scenery, and is the largest city and the most important industrial center in the state. It is the seat of the state university, the state agricultural college and experiment station, a school of mines and a hospital for the insane, and has, also, a Carnegie Library, a Y. M. C. A. building and a Federal building. Because for several years Nevada required only six months' residence before divorce proceedings could be instituted, Reno gained a wide reputation for harboring people with marital troubles. The law was changed later so a year's residence was required, and the local divorce evil was greatly lessened. Reno was settled in 1858, was incorporated in 1869 and chartered as a city in 1901. Population, 1910, 10,867; in 1917, 15,514 (Federal estimate).

RENSSELAER, *ren'se lur,* N. Y., in Rensselaer County, on the Hudson River, opposite Albany, and on the New York Central and the Boston & Albany railroads. Three bridges connect the two cities. The surrounding district is agricultural, and the town has railroad shops and manufactories of felt, leather, medicine, tools, lumber products and other articles. The settlement was incorporated as a village in 1815 and was known as Greenbush until its incorporation as the city of Rensselaer in 1897. There are remains of an old fort built in 1642. Population, 1910, 10,711; in 1917, 11,252 (Federal estimate).

RENT. One of the most eminent American economists defines rent as "that which is paid for the use of land," but in the sense in which it is commonly used, it means that which is paid for the use of buildings as well as for the use of lands. When the land upon which the building stands belongs to one owner and the building to another, the rent is divided. This condition frequently exists in large cities where a long-term lease, as for ninety-nine years, is made, and a building is erected upon the plot in question. At the expiration of the lease the building may become the property of the proprietor of the land, or the lease may be renewed.

The principal factors that determine the rent on land are quality and location. Ten acres of fertile alluvial land bordering on

a river will produce much larger crops than the same number of acres on a sandy hillside; therefore the first field would rent at a correspondingly higher rate. But location is sometimes the more important factor. Location includes certain inseparable appurtenances, such as climate and convenience to market. A field, located, for instance, on the north side of a hill will not receive as much benefit from the sun as one located on the south side, and will not produce as large crops. A man owns two farms of 160 acres each, and equally fertile; one is located within fifty miles of a large city, the other in North Dakota. It is obvious that the first farm is the more valuable, because of its proximity to a good market. It will, therefore, rent for more than the second. Location, especially with reference to convenient transportation and to business centers, is the chief factor in fixing the high rents paid for ground and buildings in cities.

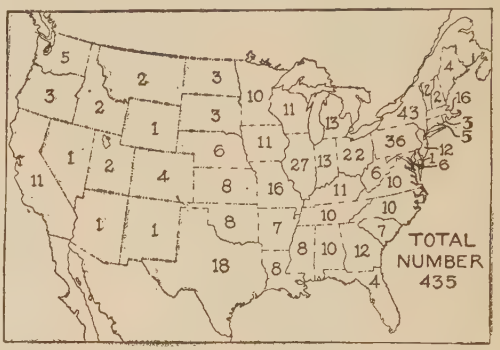
Rent is usually payable in monthly installments, but a tenant on a farm may arrange with his landlord to pay at such times as he markets his produce. In cities and towns, rent on houses and other buildings is payable in advance. A tenant who is in arrears on his rent, may, after due notice, be ejected from the premises. See LEASE; TENANT.

REPLEV'IN. See WRIT.

REPRESENTATIVES, HOUSE OF, the lower branch of the Congress of the United States, the other being the Senate. The House and the Senate are organized according to Constitutional provision; the former is much the larger body and is supposed to be closer to the people than is the Senate. That there should be direct responsibility to the people was the intention of the founders of the government, for members of the House from the beginning have been elected directly by the people for a short term of two years. In contrast, the Senators were given terms of six years, and because it was the plan that they should represent the states, the Constitution provided that they should be elected by the state legislatures. This method of selection was changed, however, by the adoption of the Sixteenth Amendment.

Number and Apportionment. The House itself determines the number of its members, and these are apportioned among the states according to population. After each national census determines the nation's population, the number of members for the following ten years is decided, and the whole population is divided by this number; thus the unit of representation is found.

In 1911 it was decided that there should be 433 Representatives for the period from 1913 to 1923 (the admission of New Mexico and



DISTRIBUTION OF REPRESENTATIVES

Arizona added two to this number). The total population divided by 433 disclosed that for the ensuing period there should be one Representative to each group of 211,877 people. The population of each state was then divided by this unit of representation to determine how many Representatives the states should elect. As soon as each state learned its number its various countries were divided into a like number of Congressional districts, each district choosing its Representative by direct ballot.

There is no law requiring a member to reside in the district from which he is elected; the Constitution provides only that he must be a resident of the state. However, the people always choose in each district a resident of the district.

This is a brief statement of the manner in which Representatives are apportioned among the people. It should be stated, however, that a state, no matter how small its population, is entitled to at least one Representative. The accompanying map shows the representation by states until 1923. Any new state admitted during a decade adds to the total membership of the House.

How Elected. The Constitution did not declare what class of people should be qualified to vote for Representatives; it left these qualifications to be determined by each state, by ordering that any person a state permitted to vote for state representative should be permitted to vote for a Representative in Congress. Thus it occurs that in many states

men and women not yet citizens of the United States, but who have made their application for naturalization, are qualified.

Powers of the House. In the article CONGRESS OF THE UNITED STATES a list of the powers of Congress is given. The powers of the House and Senate are coördinate in almost all respects; joint action of the two Houses is nearly always required to give effect to their actions. However, all bills for raising revenue (referring to tariff and other revenue measures) must originate in the House of Representatives, on the theory that the House is closer to the people. Such bills, once introduced in the House, may be altered by the Senate, and then joint action follows.

The House enjoys another special function. It considers all charges relating to impeachment of Federal officers, and votes impeachment when the facts warrant such action. The Senate then sits as a jury to try the case.

Officers and Salaries. The House chooses its officers, chief of whom is the Speaker. Other officers are a sergeant-at-arms, doorkeepers, clerks, postmaster, etc. The Speaker need not be a member of the House, but one never has been chosen from outside the membership. The members receive $7,500 per year, except the Speaker, whose salary is $12,000, the same as that of the Vice-President, the presiding officer of the Senate.

Election. The members are elected on the first Tuesday after the first Monday in November of even-numbered years. Their terms begin on the 4th of the following March, at noon, but unless a special session of Congress is called, they do not take their seats in the House until the first Monday of the following December.

State House of Representatives. The lower house of each state legislature is patterned closely after the national body. The members are usually elected for two years, from state representative districts, but in some states the term is four years.

Related Articles. Consult the following titles for additional information:

Congress of the United States	Impeachment
Constitution of the United States	Senate of the United States
	Speaker

REPRIEVE, *re preev'*, the suspension of the execution of sentence passed upon a criminal for a capital offense. The power to grant a reprieve is usually exercised by the chief executive of a state. When the legality of a conviction is questioned, or when there is alleged fresh evidence of the condemned person's innocence which seems worthy of examination, a reprieve is justified.

REPTILES, *rep'tilz*, that class of animals that includes snakes, lizards, turtles, crocodiles and alligators. Reptiles are cold-blooded vertebrates, and their bodies are covered with scales, except in case of the turtles, which have a shell for covering and protection. They wriggle along on the belly or crawl on short legs. In their internal structure and methods of reproducing their kind, reptiles bear a close resemblance to birds, and in a past geological age there were flying reptiles which seemed to form the connecting link between these two great classes in the animal kingdom (see PTERODACTYL). Reptiles breathe through their lungs during the entire period of their existence. In nearly all species the young are produced by eggs.

Geology shows that at one time the earth was inhabited by many species of gigantic and terrifying reptiles which have long since ceased to exist, and in general the class may be said to be disappearing.

Related Articles. Consult the following titles for additional information:

Adder	Copperhead	Lizard
Alligator	Crocodile	Milk Snake
Anaconda	Dragon	Moccasin Snake
Asp	Garter Snake	Monitor
Black Snake	Gavial	Python
Blindworm	Gecko	Rattlesnake
Boa	Gila Monster	Terrapin
Box Tortoise	Glass Snake	Tortoise
Chameleon	Iguana	Turtle
Cobra	Leatherback	Viper

REPUB'LIC. See GOVERNMENT, subhead *Republic.*

REPUB'LICAN PARTY, a political party organized in the United States between 1854 and 1856. It was formed by the union of various parties and groups opposed to the extension of slavery. Among these were anti-slavery Whigs, the Free-Soil party, most of the Know-Nothing party, several Abolitionist groups and a number of Northern Democrats. It held its first national convention in Philadelphia in 1856 and nominated John C. Fremont for President. Fremont was defeated, but he had 113 electoral votes, against 174 for Buchanan. In 1860 the party came into power with the election of Abraham Lincoln, and, with the exception of the elections of 1884 and 1892, directed the policies of the nation until 1912. In that year a division in its ranks caused the organization of the Progressive party and enabled the

Democratic party to win the election. Among the principles advocated by the modern Republican party are the need of a protective tariff and opposition to the doctrine of states' rights. For a detailed history of the Republican party and its relation to other political organizations, see POLITICAL PARTIES IN THE UNITED STATES.

The Anti-Federalist party took the name *Republican* when it came into power in 1801, at the election of Jefferson. Later it took the name Democratic-Republican, and this was finally changed to Democratic, a name it still retains. See DEMOCRATIC PARTY.

REPUDIA'TION, a refusal on the part of a government to pay the debts contracted by the governments which have preceded it. Repudiation has sometimes been resorted to by the smaller American republics and by states of the Union. It is frequently practiced by pretended or revolutionary governments which have no permanent existence. Sometimes cities, counties and towns have resorted to the practice.

REQUISITION. See EXTRADITION.

RESACA DE LA PALMA, *re sah'kah da lah pahl'ma,* BATTLE OF, a short but severe engagement which occurred May 9, 1846, between a force of 5,000 Mexicans, under General Arista, and about 2,300 Americans, under General Zachary Taylor. The battle took place in Resaca de la Palma ravine, in Cameron County, Texas, four miles north of Brownsville. This was disputed territory, as Mexico insisted that the Nueces River, not the Rio Grande, was its northern boundary. After the battle the United States declared war on Mexico. See MEXICAN WAR.

RESERVOIR, *rez'ur vwor,* an artificial basin for storing a large quantity of water. The construction of a reservoir often requires great engineering skill. In the selection of a site the great object should be to choose a position which will give the means for collecting with as little recourse as possible to artificial structures or excavations. The embankments or dams may be constructed either of masonry or earthwork, but the latter is the more usual, since it is generally the more economical method. Reservoirs in which the dams are built of earthwork must be provided with a waste-weir, to admit of the surplus water flowing over; in the reservoirs of which the dams are built of masonry there is no necessity for a waste-weir, as then the water may be allowed to overflow the wall, there being no fear of its endangering the works. Among the largest reservoirs connected with city water systems are the Croton and Ashoken reservoirs which supply New York City, and that of the Metropolitan Water Supply District of Boston. The largest reservoirs are those connected with irrigation projects. See IRRIGATION; RECLAMATION SERVICE; WATERWORKS.

RESINS, *rez'inz,* a class of vegetable substances, insoluble in water, soluble in alcohol and easily softened or melted by heat. They are extensively used in the manufacture of varnish. Resins are transparent or translucent, and have generally a yellow-brown color. They become electrified when rubbed. Resins may be divided into three classes: (1) Those which exude spontaneously from plants or from incisions in the stems and branches. Represented by benzoin, dragon's blood, Peru balsam, storax, copaiba, copal, lac, myrrh and turpentine; (2) resins extracted from plants by alcohol or other solvents, among which are gum ammoniacum, angelica root, Indian hemp, cubebs, manna and squill; (3) fossil resins, occurring in coal or lignite beds, such as amber, asphalt, copaline and fossil caoutchouc. Some resins, when combined with essential oils, give out a fragrant odor. *Rosin* is the name given resins exuding from cone-bearing trees. See ROSIN; TURPENTINE.

RESOLU'TIONS OF 1798. See KENTUCKY AND VIRGINIA RESOLUTIONS.

RESPIRA'TION. See BREATHING.

RESTIGOUCHE, *res ti goosh',* **RIVER**, a stream in Canada famous for its trout and salmon. It flows in a general northeasterly direction about 200 miles, separating New Brunswick from the province of Quebec. The name, an Indian word meaning *dividing like the hand,* has reference to its five branches, each from fifty to seventy miles long. The river, navigable about eighteen miles, discharges into Chaleur Bay, an arm of the Gulf of Saint Lawrence. A tidal wave ascends the estuary twenty-four miles.

RESTORATION, *res toh ra'shun,* in history the return of a country to monarchical government. It is particularly applied to the reëstablishment of the monarchy in England, succeeding the Commonwealth under Cromwell. Cromwell had beheaded the tyrannical Charles I and had set up the Commonwealth in 1649, ruling it with a strong and able hand. After his death unsettled conditions led to the overthrow of the Commonwealth in 1659

and the coronation the next year of Charles II, whose reign was officially dated not from his actual accession but from the death of his father. See COMMONWEALTH OF ENGLAND; CROMWELL, OLIVER.

RESUMP'TION OF SPECIE PAYMENTS. See SPECIE PAYMENTS, RESUMPTION OF.

RESURRECTION, *rez ur rek'shun,* the rising of man after death, to be possessed of all his powers and faculties. The resurrection of the dead is mentioned a number of times in the Old Testament, but only the Israelites are there considered. The New Testament doctrine, founded upon the resurrection of Christ, who in *Revelation* is called "The first begotten of the dead" (*Revelation* I: 5), applies to all mankind. The beautiful story of the Resurrection as told in the Gospels cannot be improved. These accounts contain evidence of the fact of Christ's rising from the dead that objectors to belief in the Resurrection have never been able to set aside. The great argument in establishing the Resurrection as the chief cornerstone of the Christian faith is set forth by Paul in *I Corinthians,* XV, but his great question, "How are the dead raised? and with what manner of body do they come?" has never been answered. The Christian Church throughout the world considers the Resurrection of Christ to be the crowning evidence of the divine character of His mission.

RESURRECTION PLANT. See JERICHO ROSE.

RESZKE, *resh'ke,* the family name of two great singers. See DE RESZKE.

RETAIN'ER, the formal engagement of an attorney by a client to prosecute or defend a suit at law, or to attend to such of the client's business as may require the services of an attorney. In the first instance the retainer is special; in the second it is general. The effect of the retainer is to confer on the attorney all the powers involved in the forms and usages of the court in which the suit is pending. The retainer is always accompanied by a fee called the *retaining fee,* or *retainer.* The acceptance of this fee binds the attorney to his client, and prevents his acceptance of a retainer from the opposite party in the suit. A general retainer prevents the attorney from rendering any service that would be against the interests of his client.

RETRIEVER, *re tree'vur,* a dog specially trained to fetch game which has been shot; it is greatly valued by sportsmen for its intelligence in the field and in the water. The larger and more familiar breed of retrievers is a cross between the Newfoundland and the setter; the smaller breed is a cross between the water spaniel and the terrier. The typical retriever is twenty or more inches high, with a stoutly built body, strong limbs, webbed toes and black, curly hair. The American retriever, commonly known as the Chesapeake Bay dog, is the best known. He is very keen of scent and is an excellent swimmer.

REUNION, *ra u nyohn',* ILE DE LA, formerly ILE DE BOURBON, an island in the Indian Ocean, between Mauritius and Madagascar, belonging to France. It is of volcanic origin, and is mountainous. Piton de la Fournaise, an intermittently active volcano, is 8,713 feet high. The climate and soil are favorable to agriculture, and about one-third of the total area of 970 square miles is under cultivation. Coffee, sugar, vanilla, spices and cocoa are the chief crops. There is considerable commerce with France and other French colonial possessions. The population, which consists largely of negroes, Indian coolies and Chinese, is about 173,300. The capital is Saint Denis.

REVAL, *ra vahl',* a fortified seaport on an inlet of the Gulf of Finland, capital of Esthonia, one of the so-called Baltic provinces of the old Russian Empire. Before the World War Reval was third in importance among the Baltic ports, ranking next to Petrograd and Riga. It has two harbors, which rarely freeze, and in peace times enjoys a thriving export trade in flax, grain, pickled anchovy (a local product), animals and liquors. The old town, occupying low ground, is medieval in aspect; in the upper town are many handsome residences and public buildings. Reval was bombarded by German forces during the war, and after the surrender of Russia it fell a prey to Germany, as did all of Esthonia. Late in 1918 the Germans withdrew (see ESTHONIA). Population, 1910, 98,995.

REVELA'TION, BOOK OF, the last book of the New Testament, called in the English Bible the *Revelation of Saint John the Divine,* also the *Apocalypse,* from a Greek word meaning *to uncover.* The author is unknown, but he is generally supposed to be the

Apostle John, who is alleged to have written the book while he was banished in the Isle of Patmos. *Revelation* is easily divided into three parts, known as the introduction, letters to the churches and the visions (of which there are nine).

No other book in the Bible has given rise to such frequent and spirited discussions,

PAUL REVERE'S HOUSE AT BOSTON
Still standing.

and many interpretations of it are in existence. One school of thinkers believes that it foretells the events that preeede the end of the world. A second school believe the prophecies were uttered against the Roman Empire, and that the emperor of Rome was the Beast that was to be put down, because of his opposition to the spread of Christianity. A more recent opinion is that *Revelation* gathers the symbolism of the Old Testament and interprets it in the light of the Christian dispensation.

REV'ELSTOKE, B. C., in the Kootenay district, on the Columbia River. It is a divisional point on the Canadian Pacific Railway and has large repair shops, which are the largest industry at the present time. There are saw mills, a sash and door factory and a hospital. As the gateway to the Kootenay country, it is the headquarters for mine supplies and also for tourists and sportsmen. North of Revelstoke is the Big Bend mining region. The neighborhood also supplies large quantities of strawberries, vegetables, lumber and brick clay. Population, 1916, about 4,000.

REVENUE CUTTER SERVICE. See COAST GUARD.

REVERE, *re veer'*, PAUL (1735–1818), an American patriot, who rode from Boston to Lexington on the night of April 18, 1775, to give warning of the approach of a British expedition, which was resisted next day at Lexington and Concord. This deed inspired Longfellow's poem, *The Ride of Paul Revere.*

Revere was born in Boston. As an outcome of his education as an engraver he engraved and printed the first paper currency of Massachusetts. He was one of the leaders of the "Boston Tea Party" (which see), and in 1774 became an active member of the Boston League, organized to watch the British in that city. After his memorable ride to Lexington, Revere became lieutenant-colonel of state artillery and accompanied the unsuccessful Penobscot expedition in 1779.

REVOLU'TION, the name given a sudden movement, political or military, having for its end a change in government. Revolutions may be peaceful, but they are usually the cause or the outgrowth of war. The American Revolution was the cause of the war which followed, and the French Revolution of 1871, in which the empire was changed to a republic, was the result of the Franco-German war of that year. Revolution denotes the popular demand for a radical and immediate change, and it is opposed to reform which favors a gradual transformation.

A revolution is *external* when a part of the state separates itself from the original state and maintains its independence, as in case of the American colonies in 1776. It is internal when it results in a change in the form of government, as in the French Revolution in 1871, the revolution in Russia in 1917, and that in Germany in 1918. A revolution which has as its aim the overthrowing of all existing government is anarchism. A world revolution of the working classes was predicted by radicals at the close of the World War. The French Revolution of 1789 was one of the most important revolutionary movements in history because of its far-reaching effects. See FRENCH REVOLUTION.

Leaders of revolutions have a personal interest in the outcome of their endeavors, as well as a patriotic impulse to serve their fellowmen. A revolutionist who succeeds in his effort is hailed as a patriot; one who fails is likely to meet the fate of a traitor, if captured.

A Private's uniform

REVOLUTIONARY WAR IN AMERICA, the name commonly given to the struggle by which the thirteen English colonies in America achieved their independence and laid the foundations for the great republic that to-day is a world power second to none.

Causes of the War. The causes which led to the war were directly due to an unfortunate policy of colonial administration on the part of the British government. It took the form of restrictions upon commerce; of taxation for the purpose of supporting administrative policies in which the colonists had no voice; the establishment of a standing army in America, partly for the defense of the colonies and partly for the repression of the spirit of independence and democracy. These restrictions culminated in measures which were coercive and unconstitutional. (These measures are given in more detail in the article UNITED STATES, subhead *History*.)

Four Periods. From a military standpoint, the war may be divided into four periods, the first coinciding roughly with the period of political agitation, and including such events as the Boston Massacre, March 5, 1770; the destruction of the *Gaspee*, June, 1772, and the Boston Tea Party, December 17, 1773.

Second Period. The second period, which may be known as the era of independence, began with the assembling of the provincial congress in Massachusetts, October, 1774, its first military event being the battles of Lexington and Concord (April 18 and 19, 1775), and the beginning of the siege of Boston, on the latter date. On May 10 the colonial force, consisting of Green Mountain Boys under the command of Ethan Allen and regulars under Benedict Arnold captured Ticonderoga, and a little later, Crown Point. The Battle of Bunker Hill, on June 17, was won by the British at so heavy a cost that it amounted to an American victory, and was the first important engagement of the war.

In the fall of 1775, one of the most brilliant expeditions of the war was undertaken —an invasion of Canada. One force under General Robert Montgomery proceeded from Ticonderoga, captured Saint John's after a siege of fifty days and gained control of Montreal. Another force under Benedict Arnold started through the Maine woods to assist Montgomery in capturing Quebec. The final assault was upon the last day of the year, but it failed, Montgomery being killed Arnold severely wounded, and the Americans were forced to retire to Crown Point. Boston fell into the hands of the Americans in March, 1776. The English withdrew, first to Halifax and then to the vicinity of New York City.

From this time three separate military movements on the part of the British were begun. These were the capture of Philadephia, the capital of the United States; the isolation of New England, by the control of the Hudson Valley; and the invasion of the Southern colonies, which were supposed to be loyal to Great Britain. The third plan was attempted first, under the leadership of General Clinton, with the aid of a fleet, but it met with a disastrous termination, when an attack upon Charleston, S. C., was repulsed by an American force in Fort Moultrie (June 28). The second period of the war closed with the adoption of the Declaration of Independence, July 4, 1776.

Third Period. The third period, which may be known as the period of suspense, was ushered in by the Battle of Long Island, August 27, 1776, and the British capture of New York City, September 15. A few months later forts Washington and Lee fell into the hands of the British, and the Americans were compelled to retreat southward, hard pressed by General Howe, who aimed to take Philadelphia. This retreat upon the part of the Americans disclosed the remarkable miltary genius of General Washington. It culminated in two notable victories: one at Trenton, in which Washington completely surprised a troop of Hessians in the midst of Christmas night carousals and captured the whole force; the other at Princeton, January 3, 1777, by which he compelled the British practically to abandon the whole state of New Jersey. During this winter, Lafayette, Baron De Kalb, Kosciusko and Pulaski arrived in America with a French force, which was to be of great service to the Americans in the pending campaigns.

In the succeeding fall the British began their campaign for the capture of the Hudson

River Valley. Burgoyne, with a force of 10,000 men, was to approach from Canada by way of Lake Champlain; Howe, with about an equal force, was to ascend the Hud-

THE WAR IN THE MIDDLE STATES
A cross indicates a battle; a square, a fort; a circle, an important town.

son River from New York; and Saint Leger, also with about 10,000, was to descend the Mohawk Valley.

Burgoyne's campaign began with a series of unimportant victories, including the capture of Ticonderoga and Crown Point, but he lost a seventh of his force at the Battle of Bennington, August 17, 1777, and was finally compelled to surrender after two serious battles near Saratoga, September 19 and October 7, the formal capitulation taking place on October 17. Saint Leger encountered serious obstacles and was finally defeated at Oriskany, August 6, and compelled to retreat to Canada. Howe, meantime, had been lured from his purpose by the attractive program of capturing the rebel capital at Philadelphia and had abandoned the forces of Saint Leger and Burgoyne to their fate and begun his famous invasion of New Jersey. By defeating the Americans at Brandywine Creek (September 11), he was able to enter Philadelphia, leaving part of his force at Germantown. The Americans advanced to attack this division October 4, but failed, and retired to Valley Forge, where they spent the winter.

Fourth Period. In the following spring the last period of the war began. It included five separate campaigns. These were (1) the operations in New Jersey; (2) the siege of Newport; (3) the war on the frontier; (4) the Hudson Valley campaign, and (5) the second invasion of the South. The Americans received the news of the French alliance early in the spring, and were also strengthened by a fleet and land force sent by France. Philadelphia was evacuated by the British, June 18, 1778. This was followed by the disastrous Battle of Monmouth ten days later, the British retiring to New York City. The Hudson Valley campaign began with the storming of Stony Point, May 31, 1779, and again July 16, but this success was somewhat clouded by the treason of Benedict Arnold in the fall of the same year.

In the South the really crucial campaign of the war was fought out, its important engagements being at Brier Creek, March 5, 1779; the capture of Charleston by the British, May 12, 1780; the defeat of General Gates at Camden, August 10; and important American victories at King's Mountain, October 7, at the Cowpens, January 17, 1781, at Guilford Court House, March 15, and at Eutaw Springs, September 8. This campaign, though at first a failure, through blunders by General Gates, was brought to successful completion by General Nathanael Greene, who finally drove the English army under Cornwallis into Virginia. Washington thereupon transferred a large part of his force

THE WAR IN THE SOUTH
A cross indicates a battle; a square, a fort; a circle, an important town.

from the Hudson River Valley to the vicinity of Yorktown, a distance of 400 miles, and there, with the coöperation of the French fleet and the French army, compelled the surrender of Cornwallis, October 19, 1781. This virtually ended the war. The siege of Newport, in which the French and Americans were also allied, resulted in the complete defeat of the American plans, and the city remained in the hands of the British.

On the frontier, the war which had begun with the fearful massacre in the Wyoming Valley was completed by the Battle of New Town, between a force under General Sullivan and a company of British and Indians, the former being successful. Meantime, George Rogers Clark had taken Vincennes and established the authority of the colonies in the Northwest Territory. The only important naval battle of the war was that between the *Bon Homme Richard,* the flagship of John Paul Jones, and the *Serapis,* on September 3, 1779. It was a brilliant victory for the Americans and one of the most important sea battles in modern history.

Treaty of Peace. The British king and Ministry reluctantly agreed to make peace, the treaty being signed at Paris, September 3, 1783. This treaty recognized the independence of the United States and established the boundaries of the new nation at the Mississippi River on the west, the Great Lakes and Saint Lawrence River on the northwest, an arbitrary boundary at about 45° north latitude on the north and the northern boundary of Florida on the south. It also made provision for the evacuation of western posts by the British, for the payment of war claims to the Tories and for the settlement of other minor questions. John Adams, Benjamin Franklin, and John Jay were American representatives of the peace commission.

Related Articles. Consult the following titles for additional information:

HISTORICAL ARTICLES

Bennington, Battle of
Bon Homme Richard
Boston Massacre
Boston Port Bill
Boston Tea Party
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Committees of Correspondence
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Germantown, Battle of
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BIOGRAPHIES

Adams, Samuel
Allen, Ethan
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Clinton, George
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Cornwallis, Charles
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Franklin, Benjamin
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Howe, William, Sir
Jones, John Paul
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Lee, Richard Henry
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Otis, James
Putnam, Israel
Revere, Paul
Ross, Betsy
Stark, John
Steuben, Baron von
Warren, Joseph
Washington, George
Wayne, Anthony

REVOL'VER, a firearm in which a number of charges, contained in a revolving cylinder, are, by pulling the trigger, brought successively into position and fired through a single barrel. For the revolver in its present form we are indebted to Colonel Samuel Colt, though repeating pistols had long been known when he invented the revolver. In Colt's weapon there is a revolving cylinder containing six chambers, placed at the base of the barrel. The cylinders contain the cartridges, which are put in from the front of the breech-piece. The revolver is fired through the single barrel, the cylinder being turned by mechanism connected with the lock, until each chamber in succession is brought round so as to form virtually a continuation of the barrel.

Many improvements have been made since the original invention by Colt. Some of these had in view increasing the rapidity of firing; others have diminished the risks to which inexperienced persons must ever be exposed in handling these weapons. The

highest degree of perfection in the revolver has been reached in the automatic pistol, which is hammerless, and fires its cartridges with great rapidity, requiring only a continuous pressure upon the trigger. This weapon has practically replaced the old-style revolver for military purposes.

In most civilized countries carrying a revolver except by policemen and other officials when on duty is a criminal offense. Such regulations have become necessary to the protection of society because of the many fatal accidents that have occurred from the handling of these weapons by inexperienced people, and also because the man who desires to carry a revolver is not supposed to be a peaceful citizen. He is very likely to consider his views and wishes superior to the law and to attempt to secure by force and intimidation privileges to which he is not legally entitled.

REXFORD, EBEN EUGENE (1848–1916), an American poet and writer on gardening and kindred subjects. As a lad he moved with his family from Johnsburgh, N. Y., his birthplace, to Wisconsin, and he was educated at Lawrence University, Appleton. When only fourteen he began contributing articles to periodicals, and in course of time came to be recognized as an authority on horticulture. He took part in many philanthropic activities and served for twenty-five years as organist of the Congregational Church of Shiocton, Wis. His best-known poem is the ballad *Silver Threads Among the Gold,* which has been set to music. Other poems are contained in the volumes *Brother and Lover* and *Pansies and Rosemary.* Of his numerous volumes on gardening, those which have been most widely used are *Home Floriculture; Flowers—How to Grow Them; Four Seasons in a Garden; The Home Garden; The Indoor Garden,* and *Amateur Garden Craft.*

REYKJAVIK, REIKJAVIK, or **REIKIAVIK,** *ra kyah veek',* ICELAND, the capital of the island, situated on the southwest coast on the Kollafjord. It is an unsubstantial town, containing chiefly wooden buildings. It is the seat of a bishop, and its principal institutions are a college, a gymnasium, several professional schools, an observatory and a library. Population, 1911, about 7,500; in 1918, about 12,000. See ICELAND.

REYNOLDS, JOSHUA, Sir (1723–1792), an English portrait painter born at Plympton, Devonshire. Through the kindness of Captain (afterward Admiral) Keppel, he was enabled to visit Italy, where he studied three years. Returning to London in 1753, and finding generous patrons in Admiral Keppel and Lord Edgecombe, his studio was thronged with people of wealth and fashion; the most famous men and women of the time were among his sitters. Many of his best canvases, including portraits of Goldsmith, Dr. Johnson, Garrick and Admiral Keppel, are in the National Gallery, London. Among the most notable of his portraits are *Duchess of Hamilton, Duke of Cumberland, Mrs. Siddons as The Tragic Muse* and *Duchess of Devonshire.*

In 1768, on the foundation of the Royal Academy, he was chosen president, soon afterward was knighted and in 1784 was appointed principal portrait painter to the king. As president of the Royal Academy he delivered his celebrated annual *Discourses on Painting,* the last of which was delivered in 1790. Reynolds was the intimate friend of Dr. Johnson, Goldsmith, Garrick, Burke and other literary celebrities, with whom he was associated in founding the "Literary Club" in 1764. Reynolds died unmarried and was buried in Saint Paul's Cathedral.

There are many of his works in the United States. In the Metropolitan Museum and the Public Library, New York, there are several fine examples, besides numerous canvases in private collections. His portraits are distinguished by dignity and grace, and above all by a harmony of color which he learned from the great Italian masters. His portraits are of much historic interest apart from their value as art, for they are said to be excellent likenesses of the originals.

RHADAMANTHUS, *rad a man'thus,* in Greek mythology, a son of Jupiter and Europa, and brother of Minos, king of Crete, whom he assisted in ruling his kingdom. He aroused the jealousy of Minos by his inflexible integrity, which earned for him the admiration of the Cretans, and was forced to flee the country. After his death he became, on account of his sense of justice, one of the three judges of the lower world.

RHEA, *re'ah,* or **MAN'DU,** a large bird popularly called the "South American ostrich," although it differs from the ostrich in so many points that naturalists are now placing it in a separate family. For instance, the rhea has three toes with claws, the

ostrich has two without claws; the rhea's head and neck have feathers, while the ostrich's are bare; the rhea is about half the size of the ostrich, and its wings are so small that they are of no use in flight.

The rhea is found on the plains of Southern Brazil, in Uruguay, Paraguay and Northern Argentina. The birds live in communities, and there are two or more females to each male. The females of each group lay their eggs in the same nest, and when twenty or twenty-five eggs have been deposited, the male sits upon them until they are hatched. After the hatching he feeds and cares for the young until they are able to care for themselves.

RHEA

RHEA, in Greek mythology, the daughter of Uranus and Ge (Heaven and Earth), sister and wife of Saturn and mother of Jupiter, Neptune, Pluto, Vesta, Ceres and Juno. She was the symbol of the reproductive power of nature, and to her was often given the name, "Mother of the Gods," or "Great Mother."

RHEIMS, or **REIMS**, *reemz*, FRANCE, a ruined city in the northern part of the republic formerly a flourishing town of over 120,000 inhabitants and the seat of one of the finest Gothic cathedrals in the world. Rheims is about 100 miles northeast of Paris, on the Vesle River. From the beginning of the World War, in 1914, until near its close, the city was under bombardment, and when the armistice came it was hopelessly in ruins. Rising above the desolation about it was the partly-ruined, beautiful thirteenth-century Cathedral of Saint Louis, a tragic memorial of the brutality and insanity of war. Its lofty towers, wonderful façade and rose window had been the joy of art tourists from all over the world, while the cathedral itself was beloved by the French people both for its religious and for its historic associations. Here were crowned the kings of France for over six centuries, and here Joan of Arc witnessed the coronation of Charles VII, in 1429. Rheims occupied the site of an old Roman town, and was an important city of the Frankish kings. It developed into one of the most picturesque cities in France, and was important industrially as a wine center and for its woolen manufactures. Population, 1914, about 120,000; in November, 1919, about 5,000, nearly all of whom existed in cellars.

RHET'ORIC, in its widest sense, the theory of verbal communication, whether spoken or written. It treats of the general rules of prose style, in view of the end to be served by the composition. In a narrower sense, rhetoric is the art of persuasive speaking, or the art of the orator, and treats of the composition and delivery of discourses intended to move the feelings or sway the will of others. In its wider sense, rhetoric treats of prose composition in general, purity of style, structure of sentences, figures of speech—in short, of whatever relates to clearness, precision, elegance and strength of expression. It is broader than grammar, which deals primarily with correctness in sentence structure, and it is studied later in school life, sometimes in the first year of high school.

RHEUMATISM. Under this comprehensive term are included a variety of physical troubles, widely different in origin. All of them, however, are characterized by exceedingly painful inflammation of joints or muscles. *Inflammatory rheumatism*, or *rheumatic* fever, is a form in which the joints are affected. It is now regarded as an infectious disease. Some authorities believe that a specific germ is the cause, but the majority hold that it results from toxins produced by diseased tonsils or other infection. This disease attacks both children and adults, but the symptoms vary considerably with the age of the patient. Severe pain and high fever characterize most cases occurring in adults, but the disease is seldom fatal unless the heart becomes involved. Heart complications are much more common with children than

with adults, and chronic heart trouble often results.

Chronic rheumatism is the general name for a large number of painful ills centering in the muscles and joints. Most of them are brought on primarily by exposure to dampness and cold, and all varieties of chronic rheumatism are consequently much less frequent in warm, dry climates. Persons with a tendency to rheumatism in any form should eat nourishing food, avoid unnecessary exposure and take excellent care of the general health.

Lumbago is a form of muscular rheumatism. The name rheumatism is often applied to affections which are in reality neuralgic in their nature.

RHINE, *rine* (in German, *Rhein*), the great historic river of Germany, one of the most beautiful and most important rivers of Western Europe. To the German people it has always seemed to symbolize the glory of their Fatherland. The provisions concerning the Rhine, in the peace treaty imposed by the allies at the close of the World War, typified unmistakably the measure of Germany's defeat. The great river was internationalized on the whole of its navigable course, and all fortifications on the east bank, to a depth of thirty miles, were ordered demolished. As a guarantee for the execution of the treaty, German territory to the west of the river was set apart to be occupied by allied troops for fifteen years. That is, the Rhine, instead of being a bulwark of German imperialism, as had been the proud boast of Teutons for fifty years, became a protective barrier for France.

Course of the River. The Rhine is formed in the Swiss canton of Grisons by two main streams, called the Vorderrhein and the Hinterrhein. The Vorderrhein rises on the slope of the Saint Gotthard Mountain, at a height of 7,690 feet above the sea, near the source of the Rhone, and at Reichenau unites with the Hinterrhein, which issues from the Rheinwald glacier. Beyond Reichenau the united streams take the name so well known. The Rhine flows northward through Lake Constance to the town of that name, between which and Basel it flows westward, forming the boundary between Switzerland and Austria. At Basel it turns once more to the north and enters Germany; and, generally speaking, it pursues a northerly course until it enters Holland, below Emmerich, when it divides into a number of separate branches, forming a great delta and falling into the sea by many mouths.

In the German part of its course the chief tributaries it receives on the west are the Ill, the Moselle, the Aar and the Erft; and on the east, the Neckar, the Main, the Ruhr and the Lippe. In Switzerland its tributaries are short and unimportant, and this section of its course is marked by the falls of the Rhine at Schaffhausen. The chief towns on its banks are Constance and Basel in Switzerland; Speyer, Mannheim, Mainz, Coblenz, Bonn, Cologne and Düsseldorf, in Germany; Arnheim, Utrecht and Leyden, in Holland. It abounds with fish, especially pike, carp, and other white fish, but the produce of its salmon fisheries has been seriously interfered with by the introduction of steam vessels. The Rhine is about 700 miles in length and is navigable without interruption to Basel, a distance of 550 miles. Much timber, coal, iron and agricultural produce are conveyed by it. Large sums have been spent every year in keeping the channel in order and in the erection or repair of river harbors, both in Germany and in Holland.

Scenic Beauties. The Rhine is distinguished for the beauty of its scenery, which attracts many tourists. Throughout a large part of its course it has hills on both sides. Pleasant towns and villages lie at the foot. Above them rise rocky steeps and slopes clothed with vines or with forests; and the castles, bridges, and fastnesses of feudal times are seen frowning from precipices apparently inaccessible. The finest part of the Rhine, from the scenic standpoint, is between Bingen and Bonn; after the Rhine enters Holland, the scenery is generally uninteresting.

The Rhine in History and Literature. The deep significance of the Rhine to the Germans is evident in their national anthem, *The Watch on the Rhine*. Lord Byron and other poets have immortalized it in their poems, and Wagner has embodied many of the legends of the Rhine in his *Nibelungen* operas. The Rhine has figured in German history since the days of Caesar. In the Middle Ages, from Basel to the Netherlands, it was under German rule. Napoleon restored the old Roman boundaries of France. After his fall, Alsace-Lorraine, which is bordered on the east by the river, continued a possession of the French until it was wrested from them by the Ger-

mans in the Franco-German war of 1870. The defeat of Germany in 1918 restored the Alsace Rhine region to France, and gave the control of the river to an international commission.

RHINOCEROS, *ri nos'er os,* a large ungainly animal, characterized by a thick, heavy body, short legs, feet with three toes, each enclosed in a single hoof, and a large head having one or two horns rising from the snout. There are five species, found only in Southern Asia, the islands of the Indian

RHINOCEROS

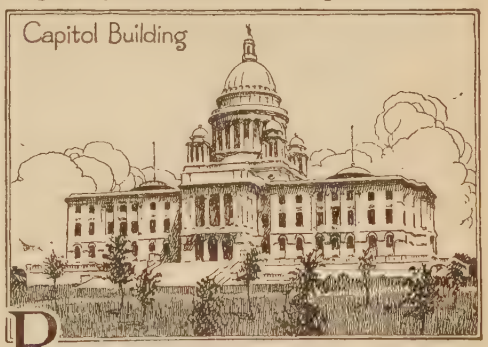
Archipelago and Southern Africa. The Indian rhinoceros is the largest and is the best known in Europe and America, where the animals are frequently found in zoölogical gardens and menageries.

The largest animals are about six feet high and weigh from 4,000 to 6,000 pounds. The horn is from one to two feet long, and is slightly curved backward. The color is a dark brownish-gray, and the skin hangs loosely on the body, in the Indian species being arranged in folds. When two horns are present, the shorter one grows behind the other. The rhinoceros lives in marshy places, and feeds upon grass, weeds and leaves of trees and shrubs. It often uses its horn to dig up and overturn small trees that it may eat the foliage. Though possessed of great strength, the rhinoceros is inoffensive unless attacked.

The Sumatran species is hairy and smaller than the Indian, and has two horns. The African species has no folds in the skin. It has two horns, and is of a ferocious disposition. Notwithstanding its short legs and heavy body, it can run for a short distance as fast as a horse.

Rhinoceros Bird. Man and insects are the only enemies of the rhinoceros. Insects torment the huge animal by getting under the folds of its skin. It finds some relief by wallowing in the mud during the day. Among its friends is the so-called rhinoceros bird, a little creature about as large as a thrush. The bird perches upon the animal's back and head, and eats large numbers of the insects that annoy it. The birds are also supposed to warn the animal of approaching danger, because they are frequently seen running over its head or flying about it, uttering shrill warning cries, which the animal seems to understand.

RHIZOPODA, *riz op'o da,* the lowest class of protozoa, comprising a large number of microscopic forms, all of which possess protoplasmic projections of the body known as pseudopodia (false feet). These projections may be used for locomotion or for taking food into the stomach. Most of the species are spherical, with radiating pseudopodia, but the lowest forms, as the amoeba, have no constant shape. The only internal organs are minute cavities having digestive and excretory functions. Reproduction is by budding or by the formation of spores.



RHODE ISLAND, the smallest state in the Union, and the last of the original thirteen to ratify the Federal Constitution. Its popular name, Little Rhody, needs no explanation, but the origin of its official name is not so clear. It has been suggested that it was given because of a supposed resemblance between the Isle of Rhodes, near Asia Minor, and the island in Narragansett Bay on which the city of Newport is located. The state is one of the southern tier of the New England group, and is bounded by Massachusetts on the north and east. The Atlantic Ocean forms its southern boundary,

and Connecticut adjoins it on the west. With an area of 1,248 square miles, Rhode Island could be contained in Texas about 205 times, and it could include within its own boundaries only three cities the size of New York. Its extreme length from north to south is a little less than fifty miles; its width, thirty-seven miles. Of the total area, 181 square miles are water surface.

People and Cities. Ten states have a smaller number of inhabitants than Rhode Island, but it is the most densely populated. In 1910, when the population was 542,610, there were 508.5 persons to each square mile. In July, 1918, according to a Federal estimate, the number of inhabitants was 637,415. Of this number, over ninety-six per cent live in towns or cities. Among the foreign born, who constitute about one-fifth of the total population, the most important numerically are English, Scotch, Irish, English Canadian, French Canadian and Italian.

Providence (1918, population 263,613), the largest city and the capital, is the second largest municipality in New England, ranking next to Boston. The next five in order of size, are Pawtucket, Woonsocket, Newport, Warwick and Cranston, each of which is over 25,000 in population. There are twelve cities in the state with more than 9,000 inhabitants.

Rhode Island was an early stronghold of the Baptist denomination, and that sect is still the strongest Protestant body. The other protestant sects, in order, are the Episcopal, Congregational, Methodist, Quaker and Presbyterian. Roman Catholics constitute about three-fourths of the whole population.

Surface and Drainage. There are no mountains in the state, but the surface is considerably diversified. The northern and western sections are hilly, and the land slopes toward Narragansett Bay and the Atlantic Ocean. The coast along the Atlantic Ocean measures about forty-five miles, but Narragansett Bay, which penetrates inland about thirty miles, affords, with its various inlets, about 350 miles of shore washed by tidewater. The southern coast, west of Point Judith, is low and sandy. To the east the shores are formed by high, rocky cliffs, interspersed with beaches of sand. Rhode Island is drained chiefly by the Pawtuxet, the Blackstone, or Seekonk, and the Pawcatuck rivers, all affording excellent water power and the last two navigable for short distances by small vessels. Providence River, on which the city of Providence is situated, is really a tidal arm of Narragansett Bay. This bay contains numerous islands, the largest being Rhode, Conanicut and Prudence.

Climate. The climate is nearly like that of adjoining states, though somewhat moderated by Narragansett Bay; the summer season is delightful, particularly in Newport, where the mean temperature is 46°. The average rainfall is forty inches in the east and forty-four inches in the west.

Mineral Resources. Rhode Island is not an important mineral state, but granite of good quality is quarried in various sections. Under Narragansett Bay and to the east of it there is a coal-bearing formation, the deposits of which are worked on a small scale. Other products of economic value are iron ore, limestone, graphite and clay. The annual value of the mineral output is less than $1,000,000.

Agriculture. The portion of the state known as the "Island of Rhode Island" and the northwestern portion are especially fertile. There are excellent markets within easy access of nearly every farm in the state, as the railroads are readily accessible, and the roads in most sections are excellent. Market gardening is successfully carried on, and corn, rye, oats and hay are produced in considerable quantities, the average yield per acre of each crop ranking well with the other New England states. Fruit is an important product. Poultry culture has also been developed extensively, and the state is widely known for its "Rhode Island reds" and other breeds of poultry.

Manufactures. There has been a steady growth in manufacturing interests in Rhode Island, and manufacturing is by far the leading industry. The various textile industries, with an annual output valued at more than $133,000,000, are the most important. In the production of cotton goods Rhode Island ranks fifth among the states; it is third in woolen and worsted goods, sixth in silk and silk products, and fifteenth in hosiery and knit goods. In the dyeing and finishing of textiles it is surpassed only by Massachusetts and New Jersey. The manufacture of jewelry and silverware is another leading industry, the center of activity being Providence, which holds first place in the Union. Other industries include the manufacture of files, rubber and elastic goods, and electrical apparatus and supplies. Bristol

is famous for its yacht-building. Though thirty-eighth in population, the state ranks fourteenth among the states in value of manufactures, and it is first in per capita value of products.

Transportation. There are ample railroad facilities. The principal road is the New York, New Haven & Hartford, which has in the state a mileage of about 200. There are also numerous electric lines, many of which are interurban, connecting the cities of Rhode Island and running into Massachusetts and Connecticut. The state is well provided with paved highways. Various steamship lines connect Providence with New York, Philadelphia, Norfolk, Boston and Baltimore.

Government. The legislature consists of a senate and a house of representatives. The senate consists of one senator from each of the thirty-eight cities and towns; the house of representatives contains one or more members from each town or city, according to population, except that no town can have more than one-fourth of the 100 members to which number the house is restricted. The legislature meets annually, and the members may receive compensation for sixty days. The executive department consists of a governor, a lieutenant-governor, a secretary of state, an attorney-general, an auditor, a treasurer, an adjutant-general a commissioner of public schools and a commissioner of insurance. The courts consist of a supreme court, the judges of which are elected by the general assembly, and such inferior courts as the legislature may establish. In 1915 a juvenile court act was passed, and in April, 1917, an act granting women the right to vote for Presidential electors. A workmen's compensation law is in effect. Rhode Island refused, through its legislature, to approve the national prohibition amendment in 1919.

Items of Interest on Rhode Island

Providence produces one-fifth of the jewelry manufactured in the United States; the refining of gold and silver from the sweepings of these great factories has become so great an industry that only one other state exceeds in it.

The official name of the state was RHODE ISLAND AND PROVIDENCE PLANTATIONS until 1842.

Rhode Island's flower emblem is the violet.

The first Baptist church in America was founded at Providence.

The highest point in the state, Durfee Hill, has an elevation of 805 feet.

Great Salt Pond, a good harbor on Block Island, ten miles off the mainland, has been improved by means of funds voted by Congress. Newport, Bristol and Warren are centers of customs districts.

At Pawtucket was established the first cotton-spinning plant erected in America.

The Rhode Island flag is white, with a golden anchor surrounded by thirteen gold stars. The motto, "Hope," is in blue beneath the anchor.

Rhode Island was the first state east of Ohio to grant women Presidential suffrage.

Questions on Rhode Island

How does the density of population of Rhode Island compare with that of other states?

How many states exceed it in size? In population?

What rank among the cities of the United States does Providence hold?

Why has the state so large a proportion of Roman Catholic communicants?

What famous seaside resort is located on an island in Narragansett Bay?

What is the highest point in the state?

How do the manufacturing and agricultural industries compare? Is there any relation between this comparison and the percentage of urban dwellers?

By whom and for what reason was the first Rhode Island settlement made?

Education. By means of increasing state support and direction, the public school system of Rhode Island has become highly developed. High schools are maintained in all municipalities, and all towns are required to provide free secondary school education. Elementary school attendance is compulsory. Among the important educational institutions are the Rhode Island Normal School at Providence, the Rhode Island State College, Rhode Island School of Design and Brown University.

History. Rhode Island was founded in 1636 by Roger Williams, an exile from Massachusetts Bay. Portsmouth, Newport and Warwick were settled soon after, and in 1644 all the settlements were united under an extremely liberal charter. From the beginning, Rhode Island maintained religious liberty. A new charter was granted in 1663, and under it Rhode Island was governed for nearly 180 years. The colony was from the beginning the seat of all sorts of religious and political controversies; it took advanced ground in favor of the Revolution, but was the last state to ratify the Federal Constitution (May 29, 1790). During the nineteenth century the state enjoyed continuous prosperity and became an important manufacturing center. Its progress was disturbed for a short time in 1842 by Dorr's Rebellion. Rhode Island furnished more than its quota of troops to the Federal army, in the Civil War, and gave equally ready response to the call for men in the World War.

Related Articles. Consult the following titles for additional information:

Brown University	Newport
Central Falls	Pawtucket
Cranston	Providence
Dorr's Rebellion	Warwick
Hutchinson, Anne	Williams, Roger
Narragansett Bay	Woonsocket

RHODES, *rohdz,* an island in the Mediterranean Sea, off the southwest coast of Asia Minor, from which it is separated by a channel about twelve miles broad. It is forty-nine miles long, and the greatest breadth is twenty-one miles. The island is mountainous, the climate healthful and the soil favorable to agriculture. The valleys produce oranges, citrus and other subtropical fruits. The population, chiefly Greeks, is about 30,000.

In ancient times Rhodes was an important Greek state, known widely for its learned men and for the celebrated colossal statue of its chief harbor (see SEVEN WONDERS). It was from 1309 to 1522 the stronghold of the

Knights of Saint John, from whom it was wrested in the latter year by the Turks. The present capital is Kastro.

RHODES, Cecil John (1853–1902) a South African statesman, known as the Empire Builder, was born at Bishop Stortford, England. After attending grammar school, he was sent in 1870 to Natal, South Africa, for his health. The next year he went to Kimberley, where he became interested in the diamond mines, and within two years amassed a fortune. Having recovered his health he returned to England and entered Oriel College, Oxford, in 1876, and was graduated in 1881, spending only half of each year at the college. In 1880 Rhodes entered the Cape Parliament, and began his efforts to extend British imperial authority in South Africa, a purpose to which he devoted the remainder of his life. In 1884, through his efforts, Bechuanaland was annexed to the British possessions, and four years later he secured from the Matabele the territory now forming Rhodesia. The British South African Company was placed in charge of this territory. Rhodes was head of the company and devoted much of his private fortune to developing the territory.

CECIL RHODES

In 1890 Rhodes became premier of Cape Colony, and while in this position he projected the Cape-to-Cairo Railway. His aggressive measures in the interest of the empire brought him into conflict with the Boers, or Dutch settlers of the Transvaal, which led to the South African War. After the Jameson Raid in 1895, Rhodes resigned as premier and went to Rhodesia. He was at Kimberley during the war and aided in the defense of the city. He died before the treaty of peace was signed.

During his life Rhodes was the most prominent figure in British South Africa, and the movements which he fostered laid the foundation for the Union of South Africa, formed in 1909. The most remarkable feature of his will was the provision for maintaining a number of students from each of the British colonies, the United States and Germany at Oxford University. See Cape-to-Cairo Railway; Rhodes Scholarships.

RHODESIA, *ro de'zi a,* a British protectorate in South Africa, extending from the Transvaal province on the south to the Belgian Congo and what was formerly German East Africa on the north. It is bounded on the east by the former German territory, Nyasaland and Portuguese East Africa, and on the west by the Congo state, Portuguese West Africa and Bechuanaland. The entire protectorate has an area of about 440,000 square miles, making it about four times the size of Colorado. The Zambezi River divides Rhodesia into two parts, that part north of the river being known as Northern Rhodesia and that south of it as Southern Rhodesia.

Northern Rhodesia. Northern Rhodesia has an area of 291,000 square miles, and a population of over 2,100 Europeans and 875,000 natives, most of whom are Bantu negroes. The territory is divided into ten administrative districts. The administrative headquarters are at Livingstone; the other important towns are Fort Jameson, Fife, Abercorn, Fort Rosebery and Broken Hill.

The country is almost wholly an elevated plateau, much of which is covered with light forests. The soil is good, and the climate is salubrious. Extensive tracts are well suited for agriculture and grazing. The chief agricultural products are corn, cotton, tobacco, wheat and European fruits. Large quantities of rubber are also produced, and the rubber trees are carefully protected. There is plenty of timber for all local needs. The chief minerals are gold, copper, zinc and lead. Coal measures have been discovered.

Southern Rhodesia. Southern Rhodesia has an area of 149,000 square miles and a population of about 32,000 Europeans, 754,000 natives and about 3,000 Asiatics. The chief towns are Salisbury, the capital of Southern Rhodesia; Bulawayo, Victoria, Umtali and Gwelo. For the purpose of administration it is divided into two districts—Mashonaland and Matabeleland. Both soil and climate are well suited to agriculture and grazing, and raising of live stock is an important industry. In 1916 the Europeans had over 203,000 acres and the natives 1,156,000 acres under cultivation. The chief crops are corn and other cereals, vegetables, fruits, Kafir corn, tobacco and cotton.

The territory is rich in minerals, and in 1917, about $183,000,000 worth of gold was

mined. Diamonds are mined to some extent, and valuable deposits of coal, copper, silver, iron, antimony and lead have been discovered.

Administration. Rhodesia is under the administration of the British South Africa Company, and the administrative system is prescribed by British Orders in Council in London. The administrator appointed by the company must be approved by the Secretary of State for the Colonies, and he is assisted by an executive council of not fewer than three members, appointed by the company and approved by the Secretary of State. There is also a legislative council. There are commissioners for each territory and for the various districts. The natives are given a share in the government, and there a number of native commissioners. Land has been set apart for native settlements, the mineral rights being reserved to the company; before the close of the World War the company made a free grant of 5,000,000 acres for settlement by soldiers who were in the service. Rhodesia was named for Cecil Rhodes, the "Empire Builder" of Africa. See RHODES, CECIL J.

Transportation and Commerce. The main line of the Cape-to-Cairo Railway (which see) extends through the protectorate from north to south, and a branch extends to Salisbury and into Portuguese East Africa. The entire mileage of the system in Rhodesia exceeds 2,400. The Zambezi and a number of other rivers are navigable. The chief towns are connected by telegraph, and a good postal system reaches all settlements.

RHODES SCHOLARSHIPS, a number of scholarships established by the will of Cecil Rhodes, for the purpose of maintaining a certain number of British, American and German students at Oxford University, in the belief that "a good understanding between England, Germany and the United States will secure the peace of the world and that educational relations form the strongest tie."

They are apportioned as follows: Rhodesia, 9; Cape Colony, 12; Natal, 3; Australia, 18; New Zealand, 3; Jamaica, 3; Canada, 24; Newfoundland, 3; Bermuda, 3; Germany, 15; United States, 96 (2 for each state). Candidates from the United States must be from nineteen to twenty-five years of age, unmarried, and citizens of the state in which application is made. The method of selection is in the hands of a committee in each state, and the chairmen of these committees are presidents of state or other prominent universities. Except in Massachusetts, where candidates from secondary schools are admitted, candidates must have attended a college for at least two years. Candidates from the United States who are otherwise eligible are not required to pass a qualifying examination, but are selected on the basis of their university or college standing, subject to any further test which the committee may impose.

In 1919 an American secretary to the Cecil Rhodes Trust was appointed, who may be consulted on questions pertaining to the Rhodes Scholarships in the United States. Students may enter the graduate or the undergraduate departments of the university, and may strive for degrees and compete for honors. See RHODES, CECIL JOHN.

RHODODEN'DRON, a genus of trees and shrubs belonging to the heath family. There are about 170 species, found in the mountains of North America, Europe and Asia; all are noted for their beautiful flowers and dark evergreen leaves. One of the best known is the *wild laurel,* or the *great rhododendron,* found in the Allegheny Mountains, where it may form almost impassable thickets by the interlacing of branches. It is a shrub or small tree that may grow to a height of thirty-five feet. It bears large white or rose-colored bell-shaped flowers, and glossy evergreen leaves.

The *catawba rhododendron* is the one commonly seen in gardens, where it is a great favorite because of its beautiful lilac-colored flowers. It grows profusely on the mountains of Virginia, and is shipped north for transplanting. Other species of equal beauty are found on the Pacific coast. The tree rhododendron of the Himalayas has silvery leaves. The rhododendron is the state flower of the states of Washington and West Virginia.

RHOMBUS, *rom'bus,* a plane figure bounded by four equal straight lines, the opposite sides being parallel and the opposite angles being two equal acute and two equal obtuse angles. See POLYGON.

RHONE, *rohn,* the principal river of France. It rises in the Rhone Glacier in Switzerland, 7,550 feet above sea level, flows southward and discharges into the Gulf of Lyons. With its tributaries—the Isère, the Durance and the Saone—it drains the south-

eastern portion of the country and brings to the sea a greater volume of water than any other river of France. The valley, lying between the plateau and the Alps, is one of remarkable beauty, and the delta formed at the mouth of the river is one of the largest in the world. The Rhone is about 500 miles long, and is navigable for 320 miles. By a magnificent system of canals navigation has been extended to the Rhine, the Seine, the Loire, the Meuse and the Belgian system of canals. The Rhone is one of the chief waterways of Europe, and, possibly with the exception of the Danube, the most important European waterway in the traffic with Asia.

RHUBARB, *roo'barb*, often called *pie-plant*, is a garden plant whose leafstalks are used as filling for pies and for sauce. A kind of wine is sometimes made from the juice. The plant has large fleshy roots, large leaves and stems six to eight feet high. The rhubarb used in medicine is prepared from the root of another species. The rhubarb plant is a native of Central Asia, but it has been transplanted into practically all the countries of the temperate regions.

RIB'BON, any narrow woven fabric, usually of silk, satin or velvet. The manufacture of ribbon forms a special branch of the textile industry and requires looms specially constructed for the purpose. Ribbons are of all widths, from one-fourth inch up to nine inches. Much ingenuity has been displayed in constructing looms on which ribbon of intricate patterns—sometimes including landscapes and portraits—are woven. On some modern looms forty ribbons may be woven at once. Ribbon is used for decorating women's and children's dresses, for tying packages and for numerous other purposes. Saint Etienne, France, is the great center of the ribbon industry. The output in the United States amounts to about $30,000,000 a year, three-fourths of which is made in Pennsylvania and New Jersey.

RIBBON FISH, the name of certain deep-sea fishes found in all salt waters. The body is like a band, from fifteen to twenty feet long, about one foot broad and an inch or two thick, and is silvery in color. The bodies of these fish, like those of all other deep-sea animals, are stored with air to resist the heavy pressure of the sea's weight, and when they happen to be brought to the surface the tendency of the cells is to burst, loosening the muscular and bony systems and killing the fish. Sometimes the fish are seen in large numbers floating dead on the water or lying on the shore, having been cast up by the waves. The fin rays in younger ribbon fishes are extraordinarily developed, some of them being several times longer than the body. The same name is also applied to a thin, though not ribbon-shaped, fish found in the Gulf of Mexico and around the West Indies. It has blackish-brown bands on a grayish body.

RIBS, in the human body, twelve pairs of bony arches constituting the walls of the chest. They are joined in front to the breastbone, or sternum, and at the back to the spinal column. The last two pairs are free in front and are called *floating ribs*. In length the ribs increase gradually to the seventh, and then grow smaller. For illustration, see the article SKELETON.

Stripping Rice in Japan

RICE, the grain that forms the principal food of one-half the population of the earth is a member of the grass family. It has been used for food for many centuries, and was known in the East long before it was introduced into Greece and Rome. It is now extensively cultivated on the lowlands of the tropical and semi-tropical portions of Southeastern Asia, China, Japan, Egypt, Southern Europe and several states of the United States. Its popularity in the Far East is much greater than in the western hemisphere, and in China and Japan it is of greater importance as a food than are corn and wheat in the United States. The annual crop amounts to 100 billion pounds, and ninety-six per cent of this amount is grown in Asia. In China and some other warm countries two crops a year are raised; the Chinese have 250 varieties of seed. The leading rice-growing states of the Union are Louisiana, Texas, Arkansas, California and South Carolina. The production in the United States is constantly increasing, but it does not yet meet the demands of the country, and a considerable quantity is imported.

The Rice Plant. Rice is an annual plant, of many varieties, but the principal ones grown in the United States are the *gold seed*

and the *white rice*. The stem is from one to six feet high, erect, simple, round and jointed; the leaves are large, firm and pointed, arising from very long, cylindrical and finely-striped sheaths; the flowers are disposed in a panicle, somewhat resembling that of the oat; the seeds are white and oblong, but vary in size and form in the numerous varieties. Rice requires a high temperature and an abundance of water. It thrives best on the lowlands of tropical or semi-tropical regions. The deltas of great rivers—the Ganges, the Irrawaddy, the Yang-tse-kiang, the Tigris, the Euphrates and the lower Mississippi—are the best rice fields in the world, because they are subject to flooding by overflow of the streams. Where sufficient water is not obtained by overflow, irrigation is necessary.

Planting and Tillage. The seed should be selected with care. In Oriental countries the seed is sown broadcast in highly fertilized mud, and the young plants are transplanted when they are two or three inches high. In the United States the seed is planted with a drill, as is wheat. After the seed is planted the ground is thoroughly wet, so the seed will sprout. When the plants appear above ground, the field is flooded to the depth of four or five inches, and the water is allowed to remain until the leaves float on the surface, when it is drawn off. The field is plowed and hoed, and the plants are allowed to root firmly. Then the land is again flooded, and the water is allowed to remain until the grain is ripe.

RICE

The rice field is divided by ridges or embankments into small sections which are separated from each other by canals, to facilitate flooding and drainage. Growing rice is of a beautiful dark green, and a field of it adds much to the beauty of the landscape. In the lowlands along rivers, the fields can usually be flooded by means of canals connecting with the river. On higher lands it is often necessary to resort to pumping, as in the prairie regions of Louisiana, Texas and Arkansas. In some parts of China and Japan, the water is pumped up to terraces on the hillside by tread-mills which are operated by men and bullocks.

Harvesting. In the United States modern agricultural methods and machinery are employed in the rice industry, and the harvester is used for cutting the grain, but in Oriental countries the hand sickle is used. The sheaves are placed in shocks and allowed to stand until dry. When the grain is dry it is thrashed in an ordinary thrashing machine, and placed in sacks, ready for shipment.

Milling. Rice as it comes from the thrashing machine is known as *paddy*. The kernel is inclosed in a brown hull, which must be removed before the rice is ready for the market. In the United States this is done by a mill invented especially for the purpose. In Eastern countries the hull is removed in various ways, such as by pounding in stone mortars, treading the grain by animals, and pounding it with flails. However, American milling machinery has been introduced into some of the great rice markets of Indo-China. After the husk is removed the rice is polished and the grains are graded according to size, after which it is packed for shipment.

Food Value. Rice contains 12 per cent water, 2 per cent fat, 77 per cent carbohydrates, 8 per cent protein and 1 per cent ash. It does not have as high a food value as wheat or corn, because of the lack of ample fat and protein. The Japanese and Chinese usually eat with it, a sauce made from beans, Americans eat it with milk, or syrup. Polishing removes a very nutritious portion of the kernel; therefore the unpolished rice has the greater food value, though it sells at a lower price.

Other Uses. In India a distilled liquor called *arrack* is made from rice. The Chinese and Japanese also make a number of intoxicating drinks from it. Rice polish, bran and straw are used as food for stock. Sandals, hats and various other articles are made from the straw. The hulls are used for filling mattresses and in packing goods, and the polish is valuable as a fertilizer.

RICE, Alice Hegan (1870–), an American story-writer, born at Shelbyville, Ky. She achieved fame as the author of

Mrs. Wiggs of the Cabbage Patch, a book which had one of the largest sales in the history of the American publishing business. The story appeals by reason of its wholesome humor, genuine sympathy, optimism and fidelity to real life. Its sequel, *Lovey Mary,* also had a wide sale. *Sandy, Mrs. Opp, A Romance of Billy Goat Hill* and *Calvary Alley* are among her more recent productions. Several of her books have been translated into German, French, Danish and Swedish, and three have been dramatized. Mrs. Rice is the wife of the poet Cale Young Rice.

RICE BUNTING, the name applied to the bobolink (which see) when in its autumn migration it reaches the rice fields of the South, where it lingers to feed.

RICE PAPER, a substance prepared from thin, uniform slices of the snow-white pith of a plant which grows in Formosa. Rice paper is prepared in China and is used in the manufacture of artificial flowers and by native artists for water color drawings.

RICH'ARD I, surnamed Coeur de Lion (the Lion-hearted) (1157–1199), king of England, second son of Henry II. He several times rebelled against his father, and in 1189, supported by the king of France, he defeated the forces of Henry, who was compelled to acknowledge Richard as his heir. On Henry's death, Richard was crowned at Westminster. The principal events of his reign are connected with the Third Crusade, in which he took part, uniting his forces with those of Philip of France. He won no important victory as a result of his undertaking, and after making a truce with the sultan he set out for England. While making his way through Austria he was taken captive and kept in prison for some time, until the payment of a large ransom.

RICHARD II (1367–1400), king of England, son of Edward the Black Prince, and grandson of Edward III, whom he succeeded in 1377. The first important event of his reign was the insurrection of Wat Tyler, in 1381 (see TYLER, WAT). Wars with France and Scotland, and the ambitious intrigues of the Duke of Lancaster, one of his uncles, disquieted the country for years. A quarrel having broken out between Richard's cousin, the Duke of Hereford, son of John of Gaunt, and the Duke of Norfolk, Richard banished them both, expressly providing, however, that Hereford should have the right to inherit any property which might fall to him. The next year, 1399, John of Gaunt, Hereford's father, died, and Richard confiscated his estates. This dishonest act was the immediate cause of the king's fall. During his absence in Ireland, Bolingbroke, as the Duke of Hereford was called, landed in Yorkshire with a small force, and the king on his return to England was solemnly deposed by Parliament, and Henry was made king. Richard was imprisoned in the castle of Pomfret, where, it is believed he was murdered.

RICHARD III (1452–1485), king of England, the youngest son of Richard, Duke of York, who was killed at Wakefield. On the accession of his brother, Edward IV, he was created Duke of Gloucester, and during Edward's reign he served him with great courage and faithfulness. When Edward died in 1483, he left to Richard the care of his heir, Edward V, then thirteen years old, and the administration of the kingdom. Richard on being acknowledged Protector of the Realm took firm hold of the government, overthrew the party of opposition and after a time confined Edward and his little brother in the Tower, and had himself declared king by Parliament. At once plots were formed to rescue the princes. The Duke of Buckingham, one of the leaders in the uprising, was caught and executed. Richard's other powerful opponent, Earl of Richmond, the Lancastrian claimant of the throne, raised an army and came against him, and on August 7 the two armies met on Bosworth Field. Richard was defeated, and Richmond became king of England as Henry VII. See ROSES, WARS OF THE.

RICHARDSON, SAMUEL (1689–1761), an English novelist, remembered chiefly as the author of the first work of English fiction that contained all essential elements of the novel. He received only an elementary education, and the greater part of his life was spent in the printing business, at first as an apprentice and later on his own account. When he was past fifty, he was asked by two booksellers to compose a "familiar letter writer," and he conceived the plan of having the letters tell a complete story. This story, told in letters, was published in 1740 under the title of *Pamela,* or *Virtue Rewarded.* In 1749 *Clarissa Harlowe* appeared, and was followed in 1753 by *The History of Sir Charles Grandison. Clarissa Harlowe* is

regarded as his masterpiece, while *Sir Charles Grandison,* in which he deals with unfamiliar characters of high life, falls somewhat below its predecessors. Richardson's novels, though wearisome through their excess of detail, give deeply sympathetic character pictures, develop a plot and have a love element, thus fulfilling the requirements of the modern novel.

RICHELIEU, *reesh lyö'* ARMAND JEAN DUPLESSIS, Duke de, Cardinal (1585–1642), a French statesman born in Paris. He was originally destined for the army; but when his brother Alphonse resigned the bishopric of Luçon, this was bestowed on him by Henry IV. He went to Paris in 1614 as deputy of the clergy of Poitou to the States-General, and insinuated himself into the favor of the queen mother, Marie de Medici, who obtained for him the post of grand almoner. In 1616 he was made secretary of state for war and foreign affairs. When Louis XIII quarreled with his mother in 1617, Richelieu was banished. In 1620, however, he managed to effect a reconciliation between the queen mother and her son.

In 1624 Richelieu was made a cardinal, and recalled to the Council of State. For eighteen years he was practically the ruler of France. He suppressed the political ambitions of the Huguenots, but allowed them religious liberty. He overthrew the great nobles by depriving them of privileges. He increased the influence of France among the nations of Europe by undermining the influence of the Hapsburgs, and did much to restore to France the prestige it enjoyed in the days of Henry IV. Richelieu was the founder of the French Academy, which is perhaps his most enduring monument.

RICHELIEU RIVER, a Canadian river, the outlet of Lake Champlain, flows almost directly north from the lake to the Saint Lawrence, which it joins at Sorel. It is about 80 miles long, varies in width from 1,000 to 8,000 feet, and, with the exception of the section between Saint John and Chambly, is navigable for river steamers. A canal from Chambly to Saint John enables boats to pass around the rapids. It flows through a level country of wonderful fertility and washes the base of Beloeil Mountain, from whose summit the stream can be seen for its entire length on a clear day. Sorel, Chambly and Saint John are the chief towns on its banks.

RICH'MOND, IND., the county seat of Wayne County, sixty-eight miles northeast of Indianapolis, on the Whitewater River and on the Pennsylvania, the Chesapeake & Ohio and the Grand Rapids & Indiana railroads. There are also electric interurban lines. Earlham College, conducted by the Friends, is located here, and the city also has the Morrison-Reeves Public Library, a law library, Eastern Indiana Hospital for the Insane, Reid Memorial Hospital, homes for orphans and for the aged and a Federal building. Glen Miller Park, near the city, covers an area of 135 acres. There are about 300 manufacturing establishments, producing threshers, engines, agricultural implements, boilers, carriages, milling machinery, flour, dairy products and other articles. Richmond was settled by Friends from North Carolina in 1816, and here occurs the annual meeting of the Orthodox Friends of Indiana. The town was chartered as a city in 1840. Population, 1910, 22,324; in 1917, 25,080 (Federal estimate).

The White House of the Confederacy

RICHMOND, VA., the capital and largest city of the state, and throughout the period of the Civil War the capital of the Confederacy. It is situated on the north bank of the James River, about 125 miles from its mouth and 115 miles south by west from Washington, on the Atlantic coast Line, the Chesapeake & Ohio, the Richmond, Fredericksburg & Potomac, the Seaboard Air Line and the Southern railroads. The city has an area of about twenty square miles, and is built on a series of hills that rise in terraces from the river until they reach altitudes varying from 170 to 250 feet above the sea. The summits of these hills are plateaus, upon which the chief residential sections are located. A number of bridges connect the city with places on the opposite side of the river.

Interesting Features. The chief point of interest is Capitol Square, with an area of twelve acres, occupying the central part of Shockoe Hill. Here is located the state capitol, completed in 1789 and constructed from a model of an old Roman Temple at Nîmes, France, and there known as Maison Carrée. This model was sent to Virginia by Thomas Jefferson and is still preserved in the Virginia State Library. Beneath the dome is a life-

size statue of Washington, by Houdon. Within this square are also located the state library and the governor's mansion, while Saint Paul's Church and the $1,400,000 city hall, which is one of the finest public buildings of the city, overlook the square. On West Broad Street is a handsome Union Station, erected at a cost of about $3,000,000, including terminal improvements. It was opened in 1919 by the Atlantic Coast Line and the Richmond, Fredericksburg & Potomac railroads.

Near the west gate of Capitol Square is an equestrian statue of Washington, by Crawford. This is of bronze and is considered one of the finest works of its kind in America. The base is surrounded by bronze figures of Thomas Jefferson, Patrick Henry, John Marshall, George Mason, Thomas Nelson and Andrew Lewis. Near by is a life-size marble statue of Henry Clay, and on the north of the capitol are the bronze statues of Stonewall Jackson, Governor Smith and Dr. Hunter McGuire.

Other buildings of historic interest are the house occupied by Jefferson Davis while president of the Confederacy and now used as a museum of Confederate relics, the home of Chief Justice Marshall, the home of General Lee and the Virginia State Library. The Masonic Temple, exposition buildings, soldiers' home and Valentine Museum are also worthy of mention as important structures in the city. In addition to Capitol Square there are a number of other parks which are of interest. The largest are Bryan and William Byrd. Libby Hill, a part of Libby Park, has a monument to the Confederate soldiers and sailors and commands an excellent view of the river and the opposite shore.

In Lee Circle is an equestrian statue of General Robert E. Lee, one of the finest pieces of art work in the city. Near here are the monuments to Jefferson Davis and General J. E. B. Stuart. A number of cemeteries, noted for their beauty, contain graves of thousands of Union and Confederate soldiers. Of these, perhaps the most interesting is Hollywood Cemetery, because it is the burial place of many noted men. It contains the graves of Presidents Monroe and Tyler, and of Jefferson Davis and of a number of noted Confederate generals.

Institutions. Among the educational institutions are the Medical College of Virginia, Richmond College, the Union Theological Seminary of Virginia (Presbyterian), the Virginia Union University (colored, Baptist) and the Hartshorn Memorial College, for colored girls. The libraries include the state library of 100,000 volumes, the state law library, the Rosemary Public Library and the library of the Virginia Historical Society. The charitable institutions include a number of hospitals, the city almshouses, the retreat for the sick, the city orphan asylum, Lee Camp Soldiers' Home and Saint Joseph's Orphan Asylum.

Churches. The churches are noted for their historic association more than for their architecture. Chief among these is the Saint John's Episcopal Church, built in 1740 and still in an excellent state of preservation and used for religious services. It was in this church that the convention met in 1775 to hear the report of the First Continental Congress, when Patrick Henry made his celebrated speech ending with the words, "But as for me, give me liberty or give me death!" Monumental Church is also of historical importance, because it stands upon the site of a building in which, in 1788, the convention met that ratified the Constitution of the United States. On this site was also located a theater which burned in 1811. Over sixty people were killed in this fire, including William Smith, then governor of Virginia.

Industry. Richmond is one of the most important tobacco markets in the United States, and has tobacco factories employing thousands of workers. These include plants making chewing tobacco, cigars and cigarettes, and packing houses and stemmeries. Other establishments of importance include foundries and machine shops, locomotive works, tool factories and hardware manufactories. Fertilizer, flour, lumber products, paper and other commodities are also made in the city. Good power is furnished by the falls in the James, and the annual output of all industries is valued at nearly $100,000,000. Richmond is an important distributing center for a large area, including southeastern Virginia and portions of North Carolina and South Carolina, so that it has a large trade. It is also connected by regular lines of steamers with the leading ports on Chesapeake Bay and the Atlantic, and in addition to this it has some trade with foreign ports.

History. Richmond was settled in 1737 and was incorporated in 1742. It became the capital of Virginia in 1779, at which time it

was only a small village. It has been the scene of many events of historical importance. In its statehouse were passed the celebrated Virginia Resolutions (see KENTUCKY AND VIRGINIA RESOLUTIONS), and the ordinance of secession for the state of Virginia, and here also occurred the famous trial of Aaron Burr. From 1861 to 1865 the city was the capital of the Confederate states. Because of this, during the Civil War it was the main point of attack by the Federal armies in the East, and no less than fifteen battles and twenty-five skirmishes occurred during the attempt of the Federal troops to capture the city. It was evacuated by the Confederate forces on April 2, 1865, at which time a fire set to the public buildings destroyed a large portion of the city. After the close of the war the city was rebuilt and has continued to prosper. Population, 1910, 127,628; in 1918, 160,719 (Federal estimate).

RICHTER, JOHANN PAUL FRIEDRICH, commonly called JEAN PAUL (1763-1825), a German author. In 1781 he entered the University of Leipsic to study theology, but soon changed his plan and devoted himself to literature. From 1787 to 1794 he taught school; but during these years he also wrote and published his *Greenland Lawsuits, Selection from the Devil's Papers* and the romance, *The Invisible Lodge.* The last-named work brought him fame. Then followed in rapid succession, and with decided success, *Hesperus, Life of Quintus Fixlein* and *Flower, Fruit and Thorn Pieces.* But his best works are the romances *Titan* and *Wild Oats* and his philosophical treatise *Introduction to Aesthetics. Levana,* a work on the education of women and children, has some pedagogical merit. Richter is the greatest humorist of modern German literature, but his works are unreliable.

RICKETS, *rik'ets,* a disease to which undernourished children are especially subject. Children between the ages of one and two are most frequently attacked. Softening of the bones is the most striking symptom, and as a result the legs become bowed, the elbows, wrists, knees and ankles become enlarged, the spine is bent forward or sideways, and the breast bone protrudes. Any child so afflicted should be under the supervision of a reliable physician and receive careful nursing. Fresh air, nourishing food, a diet suited to the child's needs and hygienic clothing are essential.

RIDEAU CANAL, *re doh'.* See CANALS OF CANADA.

RIDING, the art of sitting on a horse with firmness, ease and gracefulness and of guiding the horse and keeping him under perfect command. Walking, trotting and galloping are the three natural paces of the horse; the last is the most agreeable to the rider.

The position of a rider should be upright in the saddle; the legs and thighs should be turned in easily, so that the fore part of the inside of the knees may press and grasp the saddle, and the legs hang down easily and naturally, the feet parallel to the horse's sides, turning neither in nor out, the toes a little higher than the heels. The hand holding the reins is generally kept clear of the body, and immediately over the pommel of the saddle. A firm and well-balanced position of the body is of the utmost consequence, as it affects the horse in every motion; and the hands and legs ought to act in correspondence with each other. The art of riding is not difficult of attainment, but it is one which can only be mastered by practical instruction and constant practice.

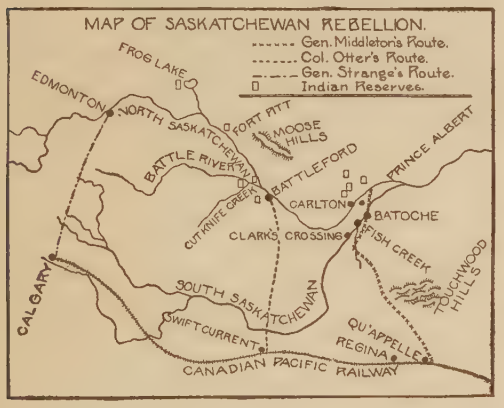
Since the advent of the automobile the practice of riding has declined, and in consequence many are deprived of a pleasant and health-giving exercise.

RID'LEY, NICHOLAS (about 1500-1555) an English churchman, one of the early martyrs to the Protestant faith. He was educated in Pembroke Hall, Cambridge, and in France, where he spent three years. Returning to England in 1533, he was made proctor to the University of Cambridge, Archbishop Cranmer made him one of his chaplains, and later he was chaplain to Henry VIII. He was appointed canon of Canterbury and of Westminster, and rose to the position of bishop of Rochester and of London. He also assisted in the preparation of the Thirty-nine Articles. On the death of Edward VI, Ridley supported the cause of Lady Jane Grey, and when Mary came to the throne he was in a dangerous position. In 1553 he was arrested and imprisoned in the Tower of London. The next year he was tried for heresy, found guilty, and burned at the stake.

RID'PATH, JOHN CLARK (1841-1900), an educator and historian, born in Putnam County, Ind., and educated at De Pauw University. He was for a time professor of languages in Baker University, Baldwin,

Kan., then professor of English and history in Asbury (now De Pauw) University, of which he became vice-president. He was largely instrumental in securing the endowment that placed this institution on its present footing and changed the name to De Pauw. Dr. Ridpath devoted the last years of his life to literary pursuits, and he was the author of a *Popular History of the United States*, a *Cyclopedia of Universal History, Life of James A. Garfield, Life and Times of Gladstone, Great Races of Mankind* and several other historical works.

RIEL, Louis (1844-1885), a Canadian agitator, was born at Saint Boniface, Man. Though generally known as a half-breed, his ancestry was mainly French. From 1866 to 1868 he worked at various occupations in Minnesota. In 1869 the transfer of the territorial rights of the Hudson's Bay Company to the Dominion government led to an armed revolt of the half-breeds under Riel's leader-



ship. In October a party under Riel turned back the new governor (Hon. Wm. McDougall) and later captured Fort Garry (Winnipeg). After holding a convention which passed a bill of rights, a provisional government with Riel as president was formed. So far the metis or half-breeds were within their rights, but the execution of Thomas Scott, an Orangeman from Ontario, roused the whole of English-speaking Canada against them. An expedition under Colonel Wolseley captured Fort Garry, but Riel escaped. He was not arrested or prosecuted, and several years later was elected to the House of Commons, from which he was expelled after a year. He was again elected in 1874, but his seat again became vacant after he was outlawed in February, 1875. For nine years he kept out of public notice, spending five years in Montana. In 1884 in response to a call from his countrymen, who had moved west to the Saskatchewan district, he returned to Canada. His own rashness and the harshness of the officials caused another rising, known as the Saskatchewan Rebellion, which was crushed after hard fighting. Riel was imprisoned at Regina, was tried and found guilty of treason, and was executed in November, 1885.

RIENZI, *re en'ze,* Cola di (about 1313-1354), a popular leader of Rome, in which city he was born and educated. Aroused by the oppression of the people under the nobles, he instigated a popular rising, assuming the title of consul of orphans, widows and the poor. For three years he harangued the people and menaced the nobles, who, thinking him mad, made no effort to suppress him. At last, in 1347, in the absence of the governor of Rome, he assembled his friends upon Mount Aventine, delivered a fiery discourse, and induced them all to subscribe to an oath for the establishment of a republican government. The people conferred upon him the title of tribune, with all the attributes of sovereignty. He banished several noble families and compelled those who remained to do him homage. In overriding the Pope and imposing heavy taxes he lost his hold on the people and was forced to leave Rome. He attempted, two years later, to gain the support of Emperor Charles IV in his attempt to reconquer Rome, but the emperor imprisoned him and handed him over to Pope Clement at Avignon. Innocent VI released Rienzi and sent him to Rome to oppose another popular demagogue, and the people received him enthusiastically, but after a turbulent administration of a few months he was killed. Bulwer-Lytton made Rienzi the hero of a novel, and Wagner used his life as the basis for an opera.

RIESENGEBIRGE, *re'zen ge beer'geh,* a mountain range of Europe, separating Silesia from Bohemia and forming a part of the Sudetic Mountains. It contains the loftiest mountains of the central part of Germany. One of the most famous peaks is Schneekoppe, 5,265 feet high.

RIFLE, *ri'f'l,* a firearm having spiral grooves in the interior of the barrel. The rifle is one of the principal weapons of modern armies. Its great advantage over the musket lies in the spiral grooves in the barrel, since these impart a rotary motion to the

bullet that keeps it in its direct path. The number and depth of these spiral channels varies in different rifles, the most approved form having the grooves and ridges of equal width and the spiral turning more sharply as it nears the muzzle.

The bullet fired is now always of an elongated form. The great advantage gained by a weapon of this construction is that the bullet, having a rotary action, is preserved in its direct path, without being subject to the aberrations that injure precision of aim in firing with unrifled arms.

Rifles were invented in Germany in 1498 and have been used as military weapons since 1631. In 1851 the first rifle firing in elongated bullet appeared, under the name of the Minié. It was succeeded in 1853 by the Enfield rifle. Next came the breech-loading rifle. In this rifle the breech is closed by a block, which contains a piston, or striker, the latter exploding the cartridge by the force of a strong spiral spring passing round it.

The repeating rifle is a development of a very old type of weapon. In the Spencer, the first used with signal success, the cartridges are in the stock of the arm; in the Winchester, the best known of repeating rifles, they are in a tube underneath the barrel. More modern military magazine rifles draw their supply of cartridges from a reserve, contained in a detachable magazine, the advantage being the greater efficiency of the weapon as a single loader. The automatic rifle is the magazine rifle's successor.

In 1918 the Browning automatic or machine rifle was adopted by the United States army. It is a gas-operated water-cooled gun, weighing about fifteen pounds, and it can be operated from the shoulder or the hip. The pressure of the gas that expels the bullet may be as high as 50,000 pounds to the square inch. A portion of the gas is used in operating the gun, so that it can be fired continuously. The magazine holds forty cartridges, and it is possible to fire over forty shots a minute. On leaving the muzzle the bullet travels at a rate of 2,300 feet per second, and accurate shooting may be done at a range of a mile or more. The penetrating power of the bullet is astonishing. It will go nearly four feet into the solid earth; will penetrate five feet of soft wood or $\frac{1}{16}$ inches of hardened steel. If a half dozen men were standing one behind another, the bullet would pass through all of them.

The ordinary sporting rifles have been equipped with the improvements that were used in military arms, but as the purpose of the sporting rifle is different, all improvements have been modified and some new ones made. For instance, the sights have been so arranged as to aid the amateur, the stocks have been omitted and the weight of the rifle has been lessened, until it can be handled with moderate ease. Improvement in the ammunition for the sporting rifle has added as much to its efficiency as the improvements in the gun itself.

The World War lent a great impetus to the manufacture of rifles and ammunition in the United States. From the beginning of the war until July, 1918, over 1,887,000 rifles were made in the country, and the manufacture of cartridges reached an average daily production of over 15,000,000.

RIGA, *re'gah*, Livonia, a seaport and the capital of the country, which formerly was one of the provinces of the Russian Empire. Riga is situated on both banks of the Düna, about ten miles above the mouth of the river, on the Gulf of Riga, an arm of the Baltic. The city is 363 miles southwest of Petrograd, and before the World War was second in importance only to the Russian capital among the Baltic ports, carrying on an extensive export trade in flax, hemp, timber, linseed, grain and eggs. It was also an important manufacturing center and supported numerous charitable and educational institutions.

The town was founded in 1201, and from an early period had a strong German element in the population. The oldest part of the city has the appearance of a medieval German town. Because of its proximity to Petrograd, Riga has frequently been an objective point in military operations. During the World War it was several times bombarded, and in 1917, after the collapse of Russia, it was captured by the Germans without resistance. The defeat of Germany a year later again changed the situation, but the city soon fell a prey to the Bolshevik army of Lenine. In the spring of 1919 Lettish troops, with the assistance of German forces, drove out the Bolsheviks. Population, 1913, 334,600

RIGA, or LIVONIA, Gulf of, an arm of the Baltic, which washes the coasts of Courland, Livonia and Esthonia. It is 100 miles long and the greatest width is seventy miles. The entrance is almost closed by Oesel Island. The chief river flowing into it is the Düna.

RIGGS, KATE DOUGLAS WIGGIN (1859–), one of the foremost of American story-writers, whose *Rebecca of Sunnybrook Farm* has been pronounced the best girls' story since *Little Women* was written. She was born in Philadelphia, and in 1877 went to live in California, establishing there the first three kindergartens for poor children on the Pacific coast. In 1895 she married George C. Riggs. She has received a high literary degree from Bowdoin College. Her sympathy with children and penetrating knowledge of child nature, gained through many years' experience as a trained kindergartner, have made three of her books, *The Training of Children, Children's Rights* and *The Republic of Childhood,* invaluable as teaching aids. She is an extremely prolific writer, and besides the many volumes of verse and stories she has arranged or written, some of them in collaboration with her sister Nora Archibald Smith, she has to her credit *Timothy's Quest, Penelope's Irish Experiences, The Story of Patsy, Susanna and Sue, The Birds' Christmas Carol, The Diary of a Goose Girl, Mother Carey's Chickens* and many others.

RIGHT OF WAY, the right of passing over land which is not one's own. Rights of this kind are public, if enjoyed by everybody; private, if enjoyed by a certain person or class of persons. Wherever there is a public right of way, there is a highway. A right of way is usually granted when one purchases a tract of land which is cut off from a public highway by land owned by another. If this land is owned by the one who sold the tract, a right of way is implied in the sale.

RIIS, *rees,* JACOB AUGUSTUS (1849–1914), an American journalist, social worker and author, was born and educated at Ribe, Denmark. He emigrated to America at the age of twenty-one, and for six years engaged in manual labor. He then became a reporter on the New York *Tribune,* but soon joined the staff of the *Sun* as a police reporter. The work that made Riis so widely known was the outgrowth of his experience in this position. His sympathies for the poor and the unfortunate led him to urge improvements in police methods and the undertaking of measures for permanent relief of the congested district in lower New York. He was influential in securing better tenement houses and the establishment of playgrounds and small parks. In 1897 he was secretary of the New York Small Parks Commission. His last years were devoted to writing and lecturing, and at the time of his death he was regarded as one of the most prominent social workers of his time. His most important publications are *How the Other Half Lives, Out of Mulberry Street,* a collection of fiction; *The Children of the Slums,* and *The Making of an American.* One of his later works, *Theodore Roosevelt, The Citizen,* has been widely read.

JACOB AUGUSTUS RIIS

RILEY, JAMES WHITCOMB (1853–1916), the "Hoosier Poet" and most beloved American poet of his generation. Although much of his verse is written in Hoosier dialect, some of his finest outpourings are in purest English. The pathos and humor of his descriptions of scenes of simple life, his keen interpretation of child life and his kindly understanding of local character, have made him one of the most widely read of modern poets.

JAMES WHITCOMB RILEY

Riley was born in Greenfield, Ind. After receiving a common school education he worked for a time as an itinerant sign painter, and later performed in a theatrical company. It was during his travels with this company that he became so intimately acquainted with the Indiana life which his poems reveal. His literary work began in 1875 with contributions to newspapers and magazines, which he wrote under the pen name of Benjamin F. Johnson, of Boone.

Among his volumes of verse are *The Old Swimmin' Hole and 'Leven More Poems, Character Sketches and Poems, Afterwhiles, Green Fields and Running Brooks, A Child World, An Old Sweetheart of Mine, Rhymes of Childhood* and the *Book of Joyous Children.* An edition of his collected works also has been published.

RIN'DERPEST, or CATTLE PLAGUE, *playg,* an infectious disease which attacks cattle, and, sometimes, sheep. It is unknown in North America, but is generally prevalent in Europe, and Central Asia, where enormous losses have been caused by epidemics of rinderpest. About ninety per cent of the animals attacked die, but if an animal survives it is thenceforth immune. The disease is conveyed from one country to another by means of cattle afflicted with it or through infected hides, wool and food. It may also be carried in the manure of sick animals, and by attendants. The cause of the disease is a minute organism or microbe (see BACTERIA AND BACTERIOLOGY), which is so small that it is very difficult to discover, though experiment has proved that it is withheld by the finest of bacterial filters.

The first sign of the disease is a high fever and a rapid pulse. As the disease progresses the respiratory and digestive organs are strongly affected. There is congestion of the mucous membrane of the mouth and throat, and ulcers are formed. In severe cases death ensues in from four to seven days. No remedy for the disease has been found, but epidemics may be held in check by inoculating healthy animals with a serum prepared for this purpose. All afflicted animals should be killed at once and their carcasses be disposed of in the shortest possible time.

RINEHART, *rine'hart,* MARY ROBERTS (1876-), one of the most popular of present-day American novelists, was born in Pittsburgh, Pa. After high-school graduation, she entered training as a nurse, and many of her subsequent short stories are founded upon her observations within hospital walls. In 1896 she married Dr. Stanley Marshall Rinehart. During the World War she enlisted in the American Red Cross, serving for a year in France and Belgium, and two of her latest books, *The Amazing Interlude* and *Hospital Love Stories,* are founded upon her personal experiences and impressions there. Other popular stories include *The Circular Staircase, Amazing Adventures of Letitia Carberry, Where There's a Will, The Street of Seven Stars, K, Tish, Bab-A, Sub-Deb* and *Dangerous Days.* Several of her books have been dramatized for the moving-picture stage. Particularly pleasing were the film presentations of the *Sub-Deb* stories, which were featured by that petite artist, Marguerite Clark. The *Letitia Carberry* sketches have also been put on the films, featuring the competent "Tish." Mrs. Rinehart possesses a keen sense of humor and insight into human nature, and her style is clear and entertaining.

RING, an ornament of gold or other metal, worn on the finger, a custom which dates back to the beginnings of human history. The form worn in early times was the signet ring, which was used as an emblem of authority and was a sign of confidence and favor. Rings were also worn as ornaments, and the Hebrews and Persians employed precious stones in setting them.

The use of betrothal and wedding rings originated with the Jews. The wedding ring is worn on the left hand, to denote a wife's subjection to her husband, and on the third finger because from it a vein is sentimentally supposed to go direct to the heart. The ring appears from an early period to have been an important feature in the coronation of kings and in the consecration of bishops, a practice which is yet continued.

Many uncivilized people wear rings to adorn the nose, ears, arms and toes. Rings also have been worn as talismans and as charms against evil. Before the invention of coinage, rings were used as money, and even to-day copper rings are common among African traders.

The ring of the Pope has an interesting significance. Upon coronation the Pope is presented with a ring by the city of Rome, which bears his name and a picture of Saint Peter in a boat. He subsequently signs each official decree with this signet. Upon his death his ring is broken, and a new one is made for his successor. It is customary for the Popes to present large thumb rings to newly-appointed cardinals.

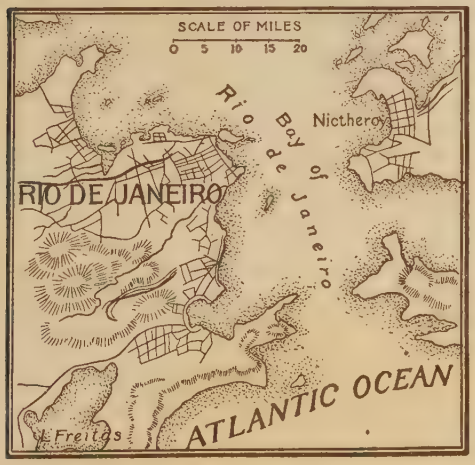
RING'WORM, a skin disease, so called because it spreads in rings. It is caused by a minute fungus, or vegetable mold, and usually occurs on the scalp or face. When on the scalp, it causes the hair to break off, loosen and fall out; if on the face, it causes soreness. Wherever it occurs, ringworm subjects the patient to the annoyance of constant itching. When the disease appears a physician should be consulted, for it will continue to spread until the fungus is killed. Ointments containing mercury or sulphur are usually effective. But, before applying them, the affected places should be shaved and the roots of the dead hairs should be pulled out.

RIO DE JANEIRO, BRAZIL

View of the water front and the harbor dotted with islands, one of which is the Sugar Loaf. Improvements such as are here shown extend for several miles along the harbor, and were built at a cost of $17,000,000. Further extensions are contemplated

The Cathedral

RIO DE JANEIRO, *re' o da zha na'ro*, BRAZIL, the city on the "most magnificent harbor in the world," is the capital of the republic and the second largest city of South America. It is situated on the west side of the Bay of Rio de Janeiro, 5,204 miles from London, 4,748 miles from New York and 5,160 miles from New Orleans. The bay is surrounded by mountains whose sides are covered with verdure, and this setting gives the city a remarkably picturesque site. The city extends along the bay for about fifteen miles, and a number of spurs of the mountains enter within its limits. Like most Spanish cities, it contains a number of squares, or plazas, around which the important buildings are grouped. The chief of these is surrounded by the city hall, the Senate house, the mint and other public buildings, and it is near the imperial palace formerly occupied by the emperor. In the older part of the town the streets are narrow and irregular. This is the commercial section and contains the most important buildings, such as the customhouse, the postoffice, the exchange, the Hospital of Santa Casa da Misericordia, the National Academy of Fine



Arts, the museum and the polytechnic institute. The public arsenal and theaters are also in this section. The leading educational institutions include the military and naval schools, the Hydrographic Institute, historical and geographical societies, the national library, with over 300,000 volumes and many manuscripts, numerous schools of medicine and surgery and a national conservatory of music. Since the latter part of the nineteenth century, Rio de Janeiro has been transformed from a typical South American city, closely resembling the towns of the Old World, into a modern American city with all up-to-date conveniences. The streets are broad and well-paved; a boulevard has been constructed along the bay at an expense of $17,000,000; the entrance to the harbor has been deepened so that the largest ships now anchor at the numerous piers; magnificent public buildings have been erected, and Sugar Loaf, one of the mountains at the entrance of the bay, has been connected with the city by an aerial trolley.

Rio de Janeiro is one of the chief commercial ports of South America and is noted for its shipments of coffee, which exceed those of any other city. It has regular steamship communication with the leading ports of the United States and Europe. It is also connected by railway with surrounding towns and the rich agricultural districts in its immediate vicinity. The manufactures are comparatively unimportant. Chief among them are textiles and flour and grist mill products; these are consumed largely at home.

The place was first settled by the French in 1555, but two years later they were dispossessed by the Portuguese, who in 1567 founded the city. In 1640 it was captured by the Dutch, and about 1750 it became the capital of Brazil. From 1808 to 1821 it was the residence of the king of Portugal. Population, 1913, estimated, 1,128,600.

RIO DE LA PLATA, *plah'tah*, an estuary formed by the Parana and Uruguay rivers in South America, is really a broad arm of the sea extending inland between Argentina and Uruguay for more than 200 miles. It is 143 miles wide at its mouth and discharges a volume of water next to that of the Amazon. The rivers bring down large quantities of silt, and the estuary is gradually filling up. It has a strong current, and shoals and narrows are constantly forming, making navigation difficult and dangerous. The best harbors are those at Montevideo, Buenos Aires and La Plata. The estuary was discovered by Diaz de Solis in 1516, and given its name, which means *silver river*, by Sebastian Cabot.

RIO GRANDE, *re'o grahn'da,* a river famed in two countries, forming the boundary between Texas and Mexico. It rises in the southwestern part of Colorado, flows southward through New Mexico, then southeastward, and empties into the Gulf of Mexico, near Brownsville, Tex. It is about 2,000 miles long, and it is navigable for small boats in the rainy season for 250 miles. Along its middle course much of its water is used for irrigation, and during the summer portions of its bed may be dry. The valley of the Rio Grande has been the scene of numerous disturbances between Mexico and the United States.

RIO NEGRO, *re'o na'gro,* a river of South America, the largest tributary of the Amazon from the north, rises in the southeastern part of Colombia, flows south into Brazil, then southeast, and joins the Amazon about fifty miles above the Madeira. The main river is formed by the union of the Guainia and the Uaupes; some geographers consider one of these streams, and some the other, to be the source of the river. The Rio Negro is navigable for ocean ships to Manaos, a thriving city ten miles above its mouth. Its entire length is 1,400 miles.

RI'OT. By the common law a riot is an unlawful assembly of three or more persons, which has actually begun to execute the purpose for which it assembled, by a breach of the peace and to the terror of the public. A lawful assembly may become a riot if the persons assembled form and proceed to execute an unlawful purpose, to the terror of the people, although they had no such purpose when they assembled. The penalty for those convicted of engaging in a riot is fixed by the statutes of the different states. If the rioting leads to loss of life, the penalty is more severe than when it results in the destruction of property only. Those who incite others to riot are held to be equally guilty with those who actually engage in creating the disturbance, even though they may be absent.

RIPA'RIAN RIGHTS. The owner of land bordering on a stream that is not navigable owns that portion of the bed of the stream that borders his land as far as its middle. He also has the right to a reasonable use of the water. However, he cannot use all the water, neither can he pollute the water, nor change the course of the stream, if by so doing he will interfere with like rights of those living farther down the stream. These lawful privileges are known as *riparian rights.* The term comes from the Latin word *ripa,* meaning *river bank.*

RIP VAN WINKLE, the hero of Washington Irving's delightful sketch by the same name. He is an idle, good-natured, henpecked scapegrace, who neglects his patch of maize and potatoes in a small village near the Hudson River, and, with his gun and dog Wolf, his companion in idleness, seeks a refuge from the scolding tongue of his sorely-tried but termagant wife in the forests of the Catskill Mountains. There he falls in with Hendrick Hudson and his crew of the *Half Moon,* who are playing at ninepins in a secluded hollow, the balls as they roll echoing along the mountains like rumbling peals of thunder. Rip is told to serve them, and while doing so he tastes again and again of the liquor he hands, till his senses forsake him.

He wakens on a bright summer morning to find his dog gone, a rusty firelock by his side, and his beard a foot long. When he returns to the village, he finds new buildings, new names on the shops, new faces at the windows. His own house is fallen into decay, his wife is dead. His sleep, he discovers, has lasted twenty years, and meantime the American Revolution has passed and left all things changed. Rip, however, is recognized by some of his old cronies, finds a home at his daughter's house, and for many more years is as comfortable at the door of the new wooden Union Hotel as ever he was at old Nicholas Vedder's quiet Dutch inn.

The story has been often dramatized, but no version has long held the stage except Boucicault's, with which the name of Joseph Jefferson is identified.

RISTORI, *re sto're,* ADELAIDE (1822-1906), a famous Italian tragic actress, the daughter of strolling players. She made her début when very young, won favor, especially, as Francesca da Rimini, and before she was twenty was recognized as the foremost Italian actress of her time. In 1846 she was married to Marquis Capranica del Grillo, and she withdrew from the stage for two years. For a time, during the French siege of Rome, she served as a nurse in the hospitals. On returning to the stage she was more popular than ever, and created a sensation at Paris even when Rachel was at the height of her power. Ristori's greatest rôles were Mary Stuart, in Schiller's drama of the same name, and Elizabeth, in a play by Giacometti.

RIVERS. Rivers have their beginning in rain drops. Some of the rain is soaked into the earth, but a portion of it runs off down the slopes and finally reaches the sea. An embankment by the roadside after a shower will furnish one with an illustration of all the facts about the formation of a river. The rain drops collect into little rills which unite to form larger rills, and these join one main stream that carries the water down the embankment. Rivers are formed in a similar manner, but on a larger plan. They usually have their origin far up in the mountains or hills, in a spring or a melting glacier. These mountain brooks unite to form larger brooks, which in turn unite to form a creek, and numerous creeks unite to form the main stream. This is the river, although it may be small. The creeks are the tributaries. The land bordering on the stream forms the *banks* of the river. That on the right when the observer faces down stream is the *right bank;* that on the left is the *left bank.* A *river system* includes the main river and all its tributaries. The region drained by a river system is a river *basin.* The height of land separating one river system from another is a *divide.*

Rivers receive their water from rain and snow, and from underground water. One-fourth of this quantity of water reaches the sea through rivers. Snow-capped mountains and glaciers sustain an important relation to rivers, since the melting snow and ice supply them with water during the summer, and in arid regions prevent them from running dry.

The rise and fall of rivers is due chiefly to irregularity of the rainfall over the river basin. A period of heavy rainfall is likely to cause floods. Excessively warm weather in early spring in those regions having a heavy fall of snow is also likely to cause floods. In periods of drought the rivers have their volume of water greatly reduced, and in arid regions they may run dry. Rivers fed largely from underground sources maintain a comparatively uniform volume. Forests are also important agents in preserving uniformity and preventing floods, because ground covered with forests absorbs a much larger portion of the rainfall than does the open country.

Work of Rivers. The form and size of a river channel depend upon the size of the stream and the degree of slope. The steepest slope is usually in the upper part of the channel, where the stream and its tributaries have great velocity and consequently great force, often sufficient to enable them to remove from their bed all but the heaviest rocks. In this part of the course the channel is narrow, with steep banks, and usually it is free from bends.

The middle course is characterized by a more gentle slope, with lower banks and a wider channel. The current is slower, and is deprived of much of its power of transportation; consequently the large pebbles and coarse gravel which the stream carries along in its upper course are dropped here, and we find the river bed and the banks covered with rounded pebbles. As this material is deposited it fills up the channel, causing the stream to become broader and more shallow. In this part of the course there is still sufficient velocity to the current to enable it to carry the finer silt to the lower part of the course where it is deposited. The current is not strong enough to remove obstructions, so the river flows around them, and for this reason a river may have a number of great curves in its middle course. Among large rivers the Mississippi affords the best illustration of this feature. Moreover, obstructions in the bed of the stream catch more or less of the silt, and by this constant addition of material in time become low islands.

The lower course is characterized by low banks, a broad channel and a slow current. Much of the silt brought from the upper and middle parts of the course is deposited along the banks and on the adjoining land whenever there is an overflow, forming broad alluvial plains noted for their fertility. A portion of the silt is also deposited on the bed of the stream, so in this part of its course the river is constantly raising itself to a higher level. The Mississippi affords the most remarkable illustration of this feature, for here the river is higher than the surrounding country and disastrous floods are frequently caused by breaks in its banks.

Canyons and Ravines. In the work of rivers we see the most striking illustration of the old proverb:

> "Water dropping day by day
> Will wear the hardest rock away."

No rock is so hard that running water will not wear a channel in it. Some rocks—such as limestone and sandstone—wear more rapidly than others, and wherever rivers flow

through limestone or sandstone regions we find in places deep channels with nearly perpendicular walls. Such channels are called *canyons.* Some of these canyons, notably the Royal Gorge in Colorado, the Grand Canyon of the Yellowstone and the Grand Canyon of the Colorado, are among the most stupendous wonders of the world. Small tributaries to a river usually wear their channels down to a level with the main stream, forming narrow gorges called *ravines.*

Estuaries and Deltas. Where a river enters the sea, through a sunken or drowned valley which the tide ascends, its mouth is a broad estuary like the Gulf of Saint Lawrence and the Rio de la Plata. However, when rivers enter the sea by gentle flow the meeting of the current and the tide causes most of the silt to be deposited at the river's mouth. In this way large alluvial plains called *deltas* are formed. The deltas of the Nile, the Rhone and the Mississippi are the most noted in the world.

Related Articles. The important rivers of the world are listed in the articles on the various countries in which they are found. For additional information consult the following titles:

Alluvium	Delta	Flood Plain
Basin	Divide	Rain
Canyon	Erosion	Valley
Cataract	Flood	Spring

RIV'ERSIDE, CALIF., the county seat of Riverside County, sixty-five miles east of Los Angeles, on the Santa Ana River and on the Southern Pacific, the Atchison, Topeka & Santa Fé, the San Pedro, Los Angeles & Salt Lake, the Riverside, Rialto & Pacific and the Pacific Electric railroads. The city is noted for its beautiful streets, drives and public parks, and it has a number of hotels that accommodate many winter visitors. It is in one of the richest orange-growing sections in the world; close to the city are 20,000 acres in oranges. There are also grown lemons, grapes, figs and other fruits. The city has a Carnegie Library, a courthouse, an Indian school and a state citrus experiment farm. It was settled in 1870, incorporated in 1886, and has adopted the commission form of government. Population, 1910, 15,212; in 1917, 20,496 (Federal estimate).

RIVER TORTOISE, *tawr'tus,* the name of a family of tortoises that live in the water, coming to shore only to deposit their eggs. They live on fishes, reptiles and birds. Well-known species are the *soft-shelled turtle* and the large and fierce *snapping turtle* of America. They inhabit almost every river and lake in the warmer regions of both hemispheres.

RIVES, *reevs,* AMÉLIE, Princess Troubetzkoy (1863–), an American novelist, born in Richmond, Va., of a distinguished family. In 1888 she married J. A. Chandler, whom she subsequently divorced, and in the same year published her first book, a collection of tales entitled *A Brother to Dragons.* The next year she created a sensation with *The Quick or the Dead.* This was followed by *According to Saint John, Barbara Deering* and *Athelwold.* Among her latest books are *The Golden Rose, Pan's Mountain, World's End, Shadows of Flames, Hidden House* and *The Ghost Garden.*

RIVIERA, *re vya'rah,* the narrow coast line of Italy and France that stretches for 172 miles along the Gulf of Genoa. The eastern half (Riviera di Levante) extends from Spezia to Genoa; the western half (Riviera di Ponente), from Genoa to Nice in France. The beauty and picturesqueness of its scenery and its mild climate lure thousands of tourists to its shores every year. The towns of both countries are linked by famous roads, originally built by the ancient Romans, and by railroads tunneled through numerous projecting headlands. Roses, violets and hyacinths are cultivated here for the London and Paris markets, as well as dates, bananas, pomegranates and prickly pears. Counted among the foremost towns of the Riviera are Nice, Monaco, Monte Carlo and Mentone, in France; Bordighera, Ospedaletti, San Remo, Rapallo, Levanto and Spezia, in Italy.

ROAD RUNNER, a curious bird of the cuckoo family, found in the southwestern

ROAD RUNNER

part of the United States and the northern part of Mexico. Its name refers to its peculiar trick of running swiftly down roads

in front of vehicles or horsemen. It is nearly two feet long, half the length being in the tail, which it can erect at right angles with its body. The body feathers are greenish-brown, each fringed with white. The head is steel-blue. The bird feeds on grains and insects, and builds its nest of sticks on low branches or on the ground. Other names for the bird are *snake killer, chaparral cock* and *ground cuckoo.*

ROAD RULES, regulations made for the safe passage of vehicles, in modern times usually decreed by statute or ordinance. In the United States, when two vehicles meet in a highway, both must turn to the right. If one vehicle overtakes another, it must pass to the left of the overtaken vehicle, which must itself turn to the right. Driving at excessive speed renders the driver liable, if accidents occur. At night vehicles must display lights. In the congested cities, these rules are amplified by the addition of many details and are extended to street cars as well as wagons and motor cars.

In England, vehicles meeting turn to the left and the overtaking vehicle bears to the right.

Rules for water travel involve a system of lights, fog signals, steering and sailing, distress and other signals. They were formulated in their present shape as the result of a maritime conference held in Washington in 1889.

ROADS AND STREETS. It has been said that roads and highways are an index to a nation's civilization. At all events, the older the nation, the better are its roads, a statement that can be verified by comparing the roads in Europe with those of the United States or Canada. Previous to the World War all the roads of Western Europe were improved, and a dirt road was an exception. In the United States and Canada, outside of cities, only a small percentage of the roads have been improved, that is, surfaced with crushed stone, gravel or some other material. The condition of the roads in the United States and Canada is no disgrace to these countries at present, because they include so much territory and have been settled so rapidly, that it has been impossible for the states and smaller communities to construct roads as fast as they are needed.

In America the terms *road* and *highway* are synonymous; however, the term *highway* is more frequently applied to improved roads connecting important points, while the term *road* is applied to common dirt roads. *County road* and *state road* are terms often used to designate important highways. *Street* formerly meant any paved road, but the name is now restricted to roads in cities and towns. All roads which have been officially designated as such are public, and everyone has the right to travel on them, with the exception of certain city streets, from which the authorities have the right to exclude heavy teaming which may destroy the surface.

Location and Management. Roads are usually located and land for them is set aside when the survey of a new country is made. If this is not done, they are located by state or county authorities, and the land is purchased. In case the owner is not willing to accept the price offered, his land is *condemned;* that is, it is taken for the road, and the price the owner receives for it is fixed by a commission appointed by a court. The owner of the property may give the land, but in order for it to become a highway the land must be accepted by the authorities, who are compelled by law to keep the road in repair. If an owner without protest allows the public to pass over a part of his property for a considerable period of time, the law will consider that he has by implication created a highway and will not permit him to close it.

In most countries, the authority over highways rests with the smallest political divisions, such as the parish in England and the town or county in the United States. However, in the United States the authority originally rested with the state, which has delegated its right to the smaller divisions. Though the public has a right to the use of the highway, it does not own the land over which it passes, but this ownership rests with the owners of the abutting property. This naturally implies a right in the public or in any traveler to the use of the whole highway, and therefore a right to remove an obstruction in any part of it, while it also implies the right of the owners of the abutting property to all the value of the land beneath

the street, that is, to mines or any other thing of value which is found there. Any legislature may establish private highways, giving the persons to whom it grants the road a right to exact toll or taxes from passers-by to pay for its repair.

Good Roads Movement. There are comparatively few surfaced roads in the United States and Canada, and many rural sections are practically deprived of means of transportation during certain seasons. Poor roads are the cause of the greatest loss of profit to a majority of the farmers of the country for the following reasons:

1. **Increased Expense of Hauling.** Careful estimates by the United States Department of Agriculture show that on a muddy earth road, the greatest load a horse can haul in an ordinary wagon is 800 pounds; on a dry earth road it is from 1,000 to 2,000 pounds, on a good gravel road about 3,300 pounds; on a macadam road, from 2,000 to 5,000 pounds; and on an asphalt road from 5,000 to 8,000 pounds. From this we see that on the best road one horse can do the work that it would require five or eight horses to do on a muddy earth road.

2. **Loss of Market.** Many farmers cannot market their crops at the time when prices are highest, because they are unable to move them on account of the condition of the roads. By the time the roads become passable, the season for that commodity has passed, or the market is overstocked and prices are lower.

3. **Value of Land.** One of the important conditions entering into the value of farm lands is access to a good market. Let two farms have the same quality of soil, and be equally distant from a market, one being on an improved road, and the other on a dirt road. The value of the farm on the good road will be considerably greater than that on the other.

Until recently, farmers have generally been opposed to levying taxes for the improvement of highways, but several influences have combined to change their views, and in many states large annual appropriations are now made for the purpose of constructing and improving the highways. The most important agencies in bringing about this movement for good roads are the Office of Public Roads, established in the United States Department of Agriculture in 1893, and reorganized as the Office of Public Roads and Rural Engineering in 1915, and the automobile, which has become a practical necessity.

Previous to 1914, the national government lent its aid chiefly through its "good roads train," or through small appropriations. But in that year Congress passed a law providing for the annual appropriation of $25,000,000, to be divided among the states for road improvement, each state government to provide an amount equal to that which it received. Many of the states had already made liberal appropriations for road improvement. The Sixty-fifth Congress (1917–1919) contracted to spend $266,750,000 within the next three years for the construction and improvement of roads. Were this appropriation divided equally among the states each state would receive over $5,500,000 to expend upon its roads. But the conditions of the appropriation are that each state must provide an amount equal to that which it receives. The fulfilment of these conditions means a fund of $533,500,000, a sum sufficient to improve practically all the roads in the country. Congress was led to make this appropriation because of the interest of the states in the good roads movement.

Construction and Management. Formerly it was believed that anybody could make a road, and the construction and maintenance of roads was in the hands of those through whose territory the road passed. To-day road-making has become a highly developed branch of engineering. In the construction of a road, the following points should receive careful attention:

(1) **Location of the Road.** It should be run so that it will connect within shortest distances the points between which it extends, provided this can be done without incurring steep grades. In mountainous and hilly countries, most careful engineering is often necessary to locate a road so as to avoid grades that are a great hindrance to the hauling of heavy loads.

(2) **Shaping of the Roadbed.** The earth upon each side is usually plowed and scraped onto the roadbed, where it is given a rounded surface, either by means of a road machine, called a grader, or by hand labor.

(3) **Surfacing.** Earth roads should be covered with gravel or crushed stone. This material should be pressed down onto the road by a heavy steel roller. It protects the surface, allows the hauling of heavy loads and renders the roadbed much more durable; hence, although surfacing is attended with considerable expense, it is economical.

In many localities cement or asphalt are used for surfacing, since they make a smooth, durable road for ordinary travel. They are not suitable, however, for roads on which there is much heavy traffic.

With the improvement of roads and modern methods of construction, the management

has passed from the petty officials of a local community to the county and the state, and is placed in the hands of road engineers who, with their assistants, see that the roads under their supervision are kept in repair. They also lay out and supervise the construction of new roads that are authorized.

National Roads. The United States government constructs and maintains the roads in the national parks, but, aside from these, it has built but one national road, the Cumberland Road (which see), extending from Cumberland, Md., to Vandalia, Ill. The automobile interests and the good roads movement, however, have led to the formation of associations having for their purpose the construction of great national highways, connecting distant parts of the country. The most noted of these projects are the Dixie Highway and the Lincoln Highway, each of which is described under its title. See PAVEMENT.

ROANOKE, VA., in Roanoke County, fifty-four miles west of Lynchburg, on the Roanoke River and on the Norfolk & Western and the Virginian railroads. It has a picturesque location near the Blue Ridge Mountains. It is the seat of Virginia College for women and Rebekah Sanitarium. Hollins Institute, a large female college, is six miles north of the city, and in the vicinity are Roanoke and Elizabeth colleges. The city also has an academy of music, an auditorium and armory, a Federal building and a city hall. Roanoke was formerly a great tobacco market, but it is now more important as an iron-manufacturing center. It contains rolling mills, car and locomotive works, tobacco factories, bottling works, knitting mills and other factories. Railroad shops employ 3,000 men. The city was incorporated in 1884. Population, 1910, 34,874; in 1917, 158,702 (Federal estimate), including Manchester, annexed in 1910.

ROANOKE RIVER, a river formed in Virginia by the union of the Dan and the Staunton. It flows eastward for a short distance in Virginia, then enters North Carolina and, pursuing a southeasterly course of about 185 miles through a picturesque valley, enters Albermarle Sound. It is navigable for 120 miles.

ROB'BERY, a major crime by which there is taken from a person, by violence or intimidation, property of value either on his person or under his protection. Violence and intimidation are the characteristics which distinguish robbery from other larcenies, and it is sufficient that so much force or threatening, by word or gesture, is used as might create an apprehension of danger of suffering personal violence and might lead a man to part with his property against his will. The punishment is now usually imprisonment for long periods. *Highway robbery,* or the forcible taking of property from travelers, in many countries is a capital offense, and in all civilized countries it is severely punished. See LARCENY.

ROB'BIA, DELLA, the name of a famous family of Italian sculptors who flourished in the fourteenth and fifteenth centuries.

Luca Della Robbia (1399–1482), was distinguished for his work in terra cotta, of which by a secret process he made a glazed or enameled variety. He was also distinguished for his work in marble and bronze. His reliefs were found in many churches and other public edifices. The fame of his work spread over Europe, and his madonnas and saints made him the typical religious sculptor of his time.

Andrea Della Robbia (1437–1528), was a nephew of Luca. He is especially famous for his colored reliefs in terra cotta, for Santa Maria delle Grazie, the Cathedral of Arezzo and the loggia of the Hospital of the Innocents, in Florence.

ROBERTS, CHARLES GEORGE DOUGLAS (1860-), a Canadian poet and story writer, was born at Douglas, near Fredericton, New Brunswick, and educated at Fredericton Collegiate School and the University of New Brunswick. He was professor of English and French literature in King's College in 1885-1887, and of economics and international law in 1887-1895. In 1897-98 he was associate editor of the *Illustrated American,* New York. Among his more important writings are *Orion and Other Poems, Songs of the Common Day, New York Nocturnes, The Canadians of Old, Around the Camp Fire, A History of Canada, The Kindred of the Wild, Barbara Ladd, The Little People of the Sycamore, The Backwoodsman, Kings in Exile, Neighbors Unknown, Feet of the Furtive, Children of the Wild* and *Hoof and Claw.*

ROBERTS, FREDERICK SLEIGH, EARL ROBERTS OF KANDAHAR, PRETORIA AND WATERFORD, (1832–1914), a British soldier, born at Cawnpore, India, affectionately known

throughout the world as "Bobs." He received his training at the Royal Military College at Sandhurst and the college of the East India Company at Addiscombe, India. For over forty years he was connected with the Indian army, rising to the position of commander-in-chief in 1885. He frequently distinguished himself for personal bravery, for skill in transporting troops and equipment and for brilliant tactics. In 1899 and 1900 he was commander in chief in South Africa. For his services in the South African War he was awarded $500,000 by Parliament and given supreme command of the British army. He died November 14, 1914, from pneumonia, contracted while on a visit to the Indian troops who were on the battle front in France.

ROBESPIERRE, *rohb spe air'*, MAXIMILIEN MARIE ISIDORE (1758–1794), one of the most prominent of the French revolutionists, was born at Arras and educated in the College of Arras and the College of Louis-le-Grand at Paris. He practiced law in Arras with eminent success, and was elected criminal judge. This position, however, he resigned in a short time, because he would not pronounce a death sentence. At this time he was known as a man of integrity, possessed of a kindly nature.

ROBESPIERRE

Robespierre held and strongly advocated the liberal democratic views so popular among the French middle classes. In 1789 he was elected deputy to the States-General, or National Convention; from that time he was the leader of the radicals in the convention, and before the close of 1791 he had become the most popular of the revolutionists. In the trial of Louis XVI, he stood strongly and successfully for the death sentence. By the help of Danton and his followers he brought about the downfall of the Girondists and later of the followers of Hébert, who were carrying the Reign of Terror farther than seemed right to Robespierre. Shortly afterward he caused Danton to be arrested and guillotined.

Robespierre's power now seemed to be completely established, and the Reign of Terror was at its height; but although his name more than any other has always been connected with the Reign of Terror, his authority was by no means absolute. Robespierre was a theorist, working toward an ideal state of society, and he felt that the excesses of the Terror were the only means by which that state could be established. His power aroused alarm in the Convention, a party was formed against him and in July, 1794, he was openly accused of despotism. A decree of arrest was carried against him, and he was thrown into Luxembourg prison. He was released by his keeper on the night of the same day and was conducted to the Hall of Commune, where his supporters were collected. On the following day Barras was sent with an armed force to effect his arrest. Robespierre's followers deserted him, and he was guillotined on July 28, 1794, together with some twenty-three of his supporters. See FRENCH REVOLUTION.

ROB'IN, or, sentimentally, ROBIN REDBREAST, is the name given to quite different songbirds in Europe and America. In European countries the robin is a small thrush, whose cheerful song is a great favorite and whose friendly ways make it familiar everywhere.

The American robin is a larger bird, measuring about ten inches from beak to tail, whose song is not especially fine, but whose

AMERICAN ROBIN

sociability and friendliness make it a welcome visitor. Its plumage is very pretty, the orange-red breast being conspicuous against

the olive-gray upper parts, the brownish wings and black head. It builds a strong nest of hay and mud and lays from four to six greenish-blue eggs. Two broods are produced in a year.

Because the robin is the first bird of the year to return from the South, it is recognized as the harbinger of spring. Robins are voracious, considerable of their food consisting of fruit, especially cherries and wild berries. Farmers protect their cultivated cherries and berries from the birds' encroachment by planting wild shrubs near by; but the robin is of service to the farmer also in that its food consists largely of insects and worms. Robins are protected from indiscriminate slaughter in the United States as well as in Canada.

ROBIN HOOD, a celebrated English outlaw, who according to the popular account, inhabited with his followers Sherwood Forest, in Nottinghamshire, and the woodlands of Barnsdale, in the adjoining West Riding. They supported themselves by levying toll on the wealthy, especially on ecclesiastics, and by hunting the deer of the forest. The principal members of his band were his lieutenant, Little John; his chaplain, Friar Tuck; William Scathlock; George-a-Greene; Much, the miller's son, and Maid Marian. The tales of Robin Hood formed the basis for many old ballads, and his adventures served as the foundation of a very successful light opera.

ROB'INSON CRU'SOE, a celebrated romance by Daniel Defoe, published in 1719. The story is supposed to be founded on the experiences of Alexander Selkirk, who was shipwrecked on Juan Fernandez, an uninhabited island off the coast of Chile, and remained there for years. It is one of the most famous of all adventure stories, and shows what a man, alone with nature and with no tools but his hands, can accomplish. The accounts of the shifts to which Crusoe was forced to resort, his ingenuities and his inventions, are given in Defoe's most realistic style, and this first novel has retained much of its original popularity to the present day. See JUAN FERNANDEZ; SELKIRK, ALEXANDER.

ROB ROY (1671–1734), a celebrated Scotch outlaw, whose exploits are described in Scott's novel *Rob Roy*. His true name was ROBERT MACGREGOR, but he assumed his mother's name, Campbell, because the clan Macgregor was outlawed by the Scotch parliament. The name *Roy*, meaning *red*, was given him because of his red hair and ruddy complexion. He was famous for his skill with the sword, and his great strength. He inherited land in the Highlands and raised cattle for the English market, and found it necessary to keep around him a band of armed men to protect his cattle from thieves. Having engaged unsuccessfully in speculation, he borrowed large sums of the Duke of Montrose, and when he was unable to pay his loan, the duke deprived him of his land. Rendered desperate by his ill fortune and this act of the duke, Rob Roy became an outlaw, and for several years made constant warfare on the duke, carrying off his cattle. By his skill and bravery he foiled all attempts to capture him and for a long time deprived the nobles of their cattle and their rent money. In 1722 he gave himself up to the English authorities, by whom he was imprisoned for a time, then pardoned.

ROB'SON, MOUNT, the highest mountain in British Columbia, is located in the southeastern part of the province, near the boundary between British Columbia and Alberta. Its altitude is 13,068 feet.

ROC, *rok*, an enormous bird of Arabian mythology, which figures in *The Arabian Nights' Entertainment*. Sindbad the Sailor found a roc's egg that was fifty paces in circumference. When the bird settled down upon it, Sindbad tied himself to one of her legs and was carried away. The roc is purely an imaginary creation.

ROCHAMBEAU, *ro shahN bo'*, JEAN BAPTISTE DONATIEN DE VIMEUR, Count de (1725-1807), a marshal of France who rendered the American colonies valuable service during the Revolutionary War. He studied for the priesthood, but entered the French army in 1742, fought in the War of the Austrian Succession and distinguished himself in the Seven Years' War. In 1780 he was sent to America with 6,000 men to aid the colonists in the Revolutionary War. Placing himself under the command of Washington, he rendered valuable assistance at the siege of Yorktown. On his return he became governor of Artois and Picardy and subsequently of Alsace; was made a marshal in 1790, and commanded the Army of the North in 1792. During the Reign of Terror he narrowly escaped the guillotine. Napoleon restored him to his former rank.

ROCHEFOUCAULD, *rosh foo ko'*. See LA ROCHEFOUCAULD

ROCH'ESTER, Minn., the county seat of Olmsted County, about 107 miles southeast of Saint Paul, on the Zumbro River and on the Chicago & North Western and the Chicago Great Western railroads. The city is in a rich agricultural region, where wheat and live stock are the principal products. There are large grain elevators, flour mills, a foundry and a camera manufactory. The prominent buildings include the Mayo clinic, a Masonic Temple, an Odd Fellows' building, a Y. M. C. A., a community house, the Commercial Club, Saint Mary's Hospital, a convent, a courthouse and a city hall. A state hospital for the insane is located here, and the city has four banks. Rochester is famous as the home of Dr. Charles H. and Dr. William J. Mayo (which see). The place was settled in 1854, and the city was chartered four years later. Population, 1910, 7,844; in 1917, about 8,600.

ROCHESTER, N. Y. the county seat of Monroe County, and the third largest city of the state, ranking below New York City and Buffalo. It is seventy miles east of Buffalo, on the Genesee River, eight miles from its mouth. Charlotte, on Lake Ontario, is its lake port. The river has worn a gorge through its course over 200 feet deep in a few places, and descends to the lake in a series of three falls.

The New York State Barge Canal is tributary to the city by a branch five miles long. The Genesee River is crossed within the city by a dozen bridges, one of which is 990 feet long and 212 feet high. The Erie Canal crosses the river by an aqueduct 848 feet long and nearly fifty feet wide. The city is served by the New York Central, the West Shore, the Erie, the Lehigh Valley, the Pennsylvania and the Buffalo, Rochester & Pittsburgh railroads. There are twenty parks. The Genesee Valley Park comprises 340 acres; Durand-Eastman is the largest, comprising 484 acres, on the shores of Lake Ontario. In all, the park area includes 1,510 acres. The public buildings of importance are a granite courthouse, a city hall, a Chamber of Commerce, a Masonic Temple, a state arsenal, the Genesee Valley Clubhouse, the Municipal buildings, a Y. M. C. A. and Convention Hall, besides a large number of imposing business blocks. The educational institutions include the University of Rochester, the Rochester Theological Seminary, Saint Bernard's Seminary (Roman Catholic), Rochester Normal School and the Mechanics' Institute, an industrial school. The libraries include the Reynold's Public Library, 50,000 volumes, the Seneca Library and the law library, and there are nine public and three private hospitals. Among the charitable institutions of importance are the Western New York Institutions for the Deaf, the state industrial school, a state hospital for the insane, the county almshouse and a number of hospitals and asylums maintained by religious denominations. The Monroe County penitentiary is also located here.

Rochester is an important manufacturing city, and its prosperity is due largely to the great water power furnished by the Genesee River. It has over 1,400 manufacturing establishments, and these employ 75,000 persons. It contains the world's largest plants for the manufacture of optical goods, cameras and thermometers, and is also the first city in the United States in the canning of fruit. It has many boot and shoe factories, and is the fourth city in the country in this industry. Over sixty per cent of the carbon paper and typewriter ribbon used in the United States comes from Rochester. Other industries include machine shops, furniture factories, agricultural implement works, wagon factories and manufacture of filing devices for offices. Formerly the city was the foremost in the Union in the manufacture of flour, but with the development of the great wheat fields in the Northwest, this industry declined. Other industries in which Rochester leads the country, and in some respects the world, are its nurseries and its trade in garden seeds, fruits and plants.

The place was first occupied by white men in 1788, but the first actual settlement did not take place until 1810. Seven years later the village was incorporated, and in 1834 it became the city of Rochester. In 1908 its present city charter became effective. Population, 1910, 218,149; in 1917, 264,714 (Federal estimate).

ROCK, in geology the term applied to the solid part of the earth. To the geologist, sand and gravel are rock. A small piece of rock is called a *stone,* and the same term is applied to rock used for building material. The various methods by which rock is formed are described in the article Geology. Rocks are classified, according to their formation, into *igneous, stratified* and *metamorphic.* Nearly all known substances are found in

the rock envelope of the earth; only a few, however, occur in large quantities. Oxygen and silicon are found in nearly all rocks; aluminum is the basis of clay; calcium is found in limestone, and magnesium occurs in rocks containing magnesia.

Related Articles. Consult the following titles for additional information:
Glacier
Igneous Rocks
Metamorphic Rocks
Stratified Rocks

ROCK'EFELLER, JOHN DAVISON (1839–), an American capitalist, probably the richest man in the world, and the chief organizer of the Standard Oil Company. He was born in Tioga County, N. Y., and educated in the public schools of Cleveland, Ohio. At the age of nineteen he entered the commission business on his own account, and two years later engaged in the oil business in Cleveland. In 1870 Rockefeller became president of the Standard Oil Company, which was consolidated with other concerns in 1882, forming the Standard Oil Trust. This was dissolved ten years later, the constituent corporations being managed separately.

JOHN D. ROCKEFELLER

In 1911 Rockefeller retired from active management of his business interests, and thereafter gave his chief attention to philanthropy. He was the founder of the new University of Chicago, to which he contributed over $23,000,000. The General Education Board, the Southern Education Board, Harvard and Yale universities, Vassar College, Barnard College and many other institutions have enjoyed the benefits of his liberality. He also generously endowed two great institutions for the alleviation of the sufferings of humanity—the Rockefeller Institute and the Rockefeller Foundation. In 1919 he gave $50,000,000 to the general education board, and a like sum to Rockefeller Foundation.

ROCK'EFELLER FOUNDA'TION, a philanthropic trust founded by John D. Rockefeller, whose original bequest to the enterprise was $100,000,000. The Foundation was incorporated by the legislature of New York in 1913. The original bequest was made that the "well-being of mankind should be promoted throughout the world." In May, 1917, another bequest of $25,000,000 was made, and $50,000,000 in the latter part of 1919. The Foundation is under the management of a self-perpetuating board of trustees, and the income from the endowment is expended in research work for suppressing disease, in aiding other institutions in prosecuting special lines of research, and in giving direct relief where conditions warrant it.

After the outbreak of the World War great sums were appropriated for relief work in Belgium and for Red Cross work. The expenditures of the Foundation for war work amounted to $17,042,140, and the total expenditures for the welfare of mankind throughout the world during the period amounted to $26,509,710. A fund of $2,000,000 has been set aside for building a medical college at the University of Chicago, and over $2,500,000 has been given the Institute for Medical Research, besides various sums to leading educational institutions, including the American Academy in Rome. Only men of the highest degree of training in their respective fields are employed by the management.

ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH. This institute was founded in 1901 by John D. Rockefeller, who endowed it with over $8,000,000. Its object is to further medical research. The property and endowment funds are in the hands of five trustees; the management is entrusted to a board of seven directors. The instructions of the founder were to administer the trust in such a way as to "accomplish the most for humanity and science." A laboratory, hospital and other necessary buildings have been erected in New York, and a corps of experts devote their entire time to research work. A great deal has already been accomplished. Departments of bacteriology, pathology, physiological and pathological chemistry, comparative zoölogy, pharmacology and experimental therapeutics are maintained. The institute also coöperates with boards of health, medical colleges and other organizations in studying and overcoming disease.

ROCK'FORD, ILL., the county seat of Winnebago County, eighty-five miles northwest of Chicago, on the Rock River and on the Chicago, Burlington & Quincy, the Illinois Central, the Chicago & North Western, the Chicago, Milwaukee & Saint Paul and the Chicago, Milwaukee & Gary railroads. The city is surrounded by an agricultural region, and has a beautiful location on both sides of

the river. Some of the prominent buildings are Memorial Hall, a courthouse, a city hall, two hospitals and a Carnegie Library. The city is the seat of Rockford College, a notable school for women, and it has a parish school and a business college. North of the city is a sanitarium, and in the southern part of the town is another. A dam across the river affords water power for numerous manufacturing establishments. Rockford is sometimes called the "Furniture City," in recognition of its leading product; other manufactures include hosiery, knit goods, agricultural implements, sewing machines, saddlery, watches, silver-plated ware, paper and flour. It was settled in 1834 and was chartered as a city in 1852. Population, 1910, 45,404; in 1917, 56,739 (Federal estimate).

ROCK HILL, S. C., in York County, about eighty miles north of Columbia on the Southern Railroad. The city is an educational center, the seat of Winthrop Normal and Industrial College of South Carolina, for women. There is a Carnegie Library and an infirmary. It is in an agricultural district in which cotton, alfalfa and fruit are extensively grown. There are cotton mills, a carriage works and manufactories of brick, jute bagging and fertilizer. Population, 1910, 7,216; in 1917, about 8,000.

ROCK ISLAND, Ill., the county seat of Rock Island County, 180 miles nearly west of Chicago, on the Mississippi River, opposite Davenport, Iowa, on the Hennepin Canal and on the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Chicago, Milwaukee & Saint Paul, the Rock Island Southern and the Davenport, Rock Island & North Western railroads. A large United States arsenal and armory is on the island of Rock Island, between the two cities. The island covers about a thousand acres, and the property of the government is worth $10,000,000. A large combination railroad and wagon bridge constructed by the Chicago, Rock Island & Pacific Railroad and the United States government spans the river from the city to the island and thence to Davenport. Another bridge connects the island with the city of Moline. The river between the island and Davenport is navigable, while the Federal government has constructed a dam on the Rock Island side. This supplies extensive water power for manufacturing, and the principal establishments are plow works, lumber mills, railroad shops, oil-cloth works, the arsenal and various other factories. Augustana College and Theological Seminary is located here, and the city has Saint Anthony Hospital, a library and a Federal building. The place was settled in 1836, and the city was chartered in 1849. The city is governed on the commission plan. Population, 1910, 24,335; in 1917, 29,452 (Federal estimate). With Davenport and Moline there is a metropolitan district of more than 100,000 people.

ROCK SALT. See Salt, subhead *Rock Salt.*

ROCKY MOUNTAINS, the name commonly applied to that great mountain system extending through North America from Central America nearly to the Arctic Ocean, and forming the "backbone of the continent." In the larger works on geography this mountain system is frequently called the Pacific Cordillera. In the sense in which modern geographers use the name, however, it applies only to the eastern ranges of this great system north of Mexico. In the latter country the system is known as the *Cordilleras.* The Rocky Mountains of Canada are known as the *Canadian Rockies.*

Divisions and Ranges. In the United States and Canada this great chain of mountains is composed of numerous ranges and groups of ranges, separated from one another by valleys and plateaus. The first great division is made by the Laramie Plateau, a large tract of level land from 7,000 to 8,000 feet in altitude, crossing the southeastern part of Wyoming. It was over this plateau that the first transcontinental railway, the Union Pacific, found a path leading to the Pacific coast.

South of the Laramie Plateau, there is a group of ranges which together are called the Park Mountains, because they surround large tracts of comparatively-level land. The most extensive of these, San Luis Park, extends from Southeastern Colorado into New Mexico, and is 130 miles long and from twenty to forty miles wide. The Rio Grande traverses the entire length, and is fed on the way by numerous mountain streams. However, owing

to the arid climate and intense heat of summer, the park is barren land. One of the most majestic peaks, Sierra Blanca, with an altitude of over 14,000 feet, rises on the eastern border.

The individual summits as well as the various ranges comprising the Park Mountains are remarkable for their massiveness, their great altitude and their picturesque scenery. Over thirty peaks in this group have altitudes exceeding 14,000 feet, and the portion of this region whose altitude exceeds 10,000 feet is far larger than any other area of similar altitude on the continent. Among the most widely-known summits in the group are Pike's Peak and the Mount of the Holy Cross. The valleys or passes between these ranges are traversed by railways and afford the traveler opportunity to behold some of the grandest scenery in the world. The system attains the greatest breadth in this region, being about 1,000 miles wide on a line running from San Francisco through Denver and Kansas City.

North of the plateau, the Bitter Root, forming a portion of the boundary between Montana and Idaho; the Bighorn, in Western Wyoming; the Tetons, south of Yellowstone Park, and the Wind River Mountains, in Wyoming, are the most important ranges. Fremont's Peak, with an altitude of 13,790 feet, is the highest summit in this group. These ranges extend more nearly north and south, and the park feature is not prominent, with the exception of Yellowstone Park, which is a plateau surrounded by lofty ranges.

Although the summits of the Canadian Rockies are lower than many in the United States, many of the peaks themselves are higher; consequently, the scenery in the Canadian Rockies is more striking and awe-inspiring than in the United States. This is because the summits in the United States rest upon a plateau from 5,000 to 8,000 feet in altitude, while in Canada this plateau has an altitude of only 3,000 to 4,000 feet. Many of the highest summits in the Canadian Rockies have large glaciers, and in this respect resemble the Alps. West of the main ranges are subordinate ranges, including the Selkirks and the Gold Range. Mount Robson, in British Columbia, with an altitude of 13,000 feet, is the highest peak in the group.

General Character of the Mountains. The Rocky Mountains were formed by volcanic action which threw large quantities of molten rock from the earth's interior, and by folding of the earth's crust. They were formed later than the Appalachian Mountains. Their summits have not been worn down by the action of water, and consequently their general character is rugged. The eastern escarpment is usually higher and more abrupt than the western. In those regions where there is sufficient moisture, the sides are clothed with forests up to the tree line, but in the arid regions they are bare. The entire system is rich in minerals, and valuable deposits of gold, silver, copper and lignite are found in many places. The ores are quite extensively worked, but only a little coal has yet been mined. The ranges comprising the Rocky Mountain system are described under their respective titles.

See CASCADE RANGE; COAST RANGE; SELKIRK MOUNTAINS; SIERRA NEVADA, and other similar titles.

ROCKY MOUNTAINS PARK. See PARKS, NATIONAL.

ROCKY MOUNTAIN WHITE GOAT, an animal of the goat-antelope family, inhabiting the higher altitudes of the Rocky Mountains from California to Alaska. It is about three feet high, and in both sexes there are slender black horns curving backward. The small hoofs are also black. It has a long, silky, pure white coat, which enables it to conceal itself in the snow. It is very skilful in climbing and rapid in its movement, so that hunting it is an exciting and not always a successful pastime. It is never found in large flocks, but as the range of any animal is not very great, its paths, or trails, are often clearly beaten into the ground. Its flesh is good to eat, and its hide is valuable for making rugs.

RO'DENTS, or **RODENTIA**, *ro den'she a*, an order of mammals represented by mice, rats, gophers, squirrels and a number of other well-known animals. The rodents are gnawers, and their distinguishing characteristic is the possession of large, chisel-like front teeth which enable them to gnaw hard substances. These teeth have a hard enamel on the outside and a softer enamel on the inside, so they have an edge shaped like that on a chisel.

There are more than twenty families and several thousand species in the order. They vary in size from the mouse, the smallest, to the capybara of South America, which is

four feet in length. In general, they are furry, though sometimes they are spiny; they walk flat-footed, and their toes are armed with claw-like nails, or resemble parted hoofs. They live chiefly upon the ground, though a few are tree lovers, and some are aquatic. In the back part of the mouth is a cavity, in which the rodents can store substances that are being gnawed, without taking the chips into the mouth proper. Most of them are active, vigorous animals, and some have become great pests to the human family.

Related Articles. Consult the following titles for additional information:

Agouti	Guinea Pig	Pika
Bandicoot	Hamster	Porcupine
Beaver	Hare	Prairie Dog
Chinchilla	Hedgehog	Rabbit
Chipmunk	Jerboa	Rat
Dormouse	Marmot	Squirrel
Flying squirrel	Mouse	Vole
Gopher	Muskrat	Zoölogy

RODIN, *ro'dan*, AUGUSTE (1840–1917), the foremost French sculptor of his century, and one of the greatest of all time, was born in Paris. He introduced an entirely new technic in the handling of marble and subject. His powers developed early, and at twenty-two he executed a very fine study called *Broken Nose*. During the Franco-German War he served in the National Guard and afterwards lived for a time in Brussels. In 1877 he exhibited at Paris his *Age of Bronze*, which, because of its daring realism, created a sensation. This was followed by a bust of Saint John (Metropolitan Museum, New York), *Saint John Preaching* and *The Thinker*, the last probably his best-known work. His *Bourgeois de Calais*, a work of intense naturalism and dramatic power, is one of the great achievements of modern sculpture. *Adam and Eve* and the *Bather*, both in the Metropolitan Museum, New York, *The Kiss, Francesca da Rimini* and the *Sphinx* are other works of supreme genius.

AUGUSTE RODIN

The work of Rodin is not merely that of a master of anatomy and composition; it is the work of a psychologist. The wonderful texture of flesh, the realistic suggestion of muscular strength, are not more remarkable than the intellectual significance of his subjects. He introduced an entirely new method of finishing surfaces—a method which marks one of the chief technical advances in sculpture. Instead of the slick and shiny finish of the classic school he produced a surface the texture of loaf sugar—extremely beautiful and naturalistic.

ROE, EDWARD PAYSON (1838–1888), an American clergyman and novelist, born in Orange County, New York. On the completion of his theological studies, he became a chaplain in the volunteer service; afterwards he was pastor of a Presbyterian church at Highland Falls, N. Y. The great Chicago fire of 1871 furnished him with a subject for his first novel, *Barriers Burned Away*. He resigned his pastorate and settled at Cornwall-on-the-Hudson in 1874, where he devoted himself to literature and the cultivation of small fruits. Fifteen novels came from his pen, all of which have been reprinted in Great Britain and have been widely read on both sides of the Atlantic. The best known are *Near to Nature's Heart* and *Opening of a Chestnut Burr*. He also wrote *Play and Profit in My Garden* and *Success with Small Fruits*.

ROEBLING, *ro'bling*, JOHN AUGUSTUS (1806–1860), the builder of the Suspension Bridge across the gorge at Niagara, and designer of the Brooklyn Bridge over East River, New York, was born in Muhlhausen, Prussia, and educated in the Polytechnique School at Berlin. He emigrated to America in 1831 and settled in Pittsburgh, was made assistant engineer of slack-water navigation on the Beaver River, and later surveyed the route followed by the Pennsylvania Railroad across the Allegheny Mountains. He then engaged in the manufacture of wire rope, which he used in constructing suspension aqueducts and bridges. Roebling's success in this line of work soon gave him a wide reputation, and when it was decided to construct a bridge across the gorge at Niagara in 1852, he was called upon to direct the work. For years, the Niagara Suspension Bridge was the greatest structure of the kind in the world, and its completion was an epoch-making event in transportation in the United States.

The Brooklyn Bridge was the first suspension bridge across East River, and was a much greater undertaking than the Niagara bridge. The plans for this bridge were all completed under Roebling's supervision, but

he died before the work of construction was begun, and this was carried on under the direction of his son, William A.

ROE'BUCK, a European deer of small size, the adult measuring about two feet in

ROEBUCK

height at the shoulders. The antlers, about eight inches long, are small and rough and have two sharp tines. The body is reddish-brown in summer and becomes a pale olive as winter approaches. These animals inhabit mountainous and wooded districts. When irritated or alarmed, they prove very dangerous adversaries and are able to inflict severe wounds with their antlers. They are seen in solitary pairs, which mate for life.

ROENTGEN, *runt'gen*, **RAYS**, or **X-RAYS**, the name given peculiar rays discovered in 1895 by Professor William Roentgen of the University of Wurzburg, while he was experimenting with Crookes tubes. Prof. Roentgen gave them the name X-rays because he did not understand their nature. The name was afterwards changed to *Roentgen rays* in honor of their discoverer.

The apparatus for producing Roentgen rays consists of an irregular globular tube, into each end of which a platinum wire is passed, to serve as a conductor, and from which the air has been exhausted as completely as possible. A concave disk of aluminum is attached to the *negative*, or *cathode*, pole, and a flat disk of platinum to the *positive*, or *anode*, pole. The platinum plate is placed at the focus of the aluminum disk and at an angle of 45° to its plane. When a strong electric current is passed through the tube the platinum disk is heated red hot. It is upon this disk that the Roentgen rays are produced, and they pass out through the walls of the bulb.

Roentgen rays are invisible, and can be detected only by their effects. They cannot be reflected or refracted like rays of light, and they pass through many substances that are opaque to light rays, such as wood, paper, cloth and muscular tissue. They will not pass through glass or lead. Certain substances, as compounds of calcium, barium and platinum, become luminous when exposed to cathode or negative rays, and in a dark room they give off light of a peculiar color. If an object is placed between a screen coated with one of these substances and a Roentgen ray tube, its shadow will appear on the screen provided it is opaque to these rays. For example, if the hand is placed between the screen and the tube, a mere outline of the muscular tissue will appear, while the bones will form a dark shadow, so that the skeleton of the hand is distinctly seen. A ring on the finger will give a still darker shadow than the bones. A pencil with a metallic head shows the head and the lead core, but not the wood encasing it.

Uses of Roentgen Rays. The peculiar properties of Roentgen rays make them of value to physicians for detecting the condition of broken bones, locating objects that have entered the body, such as bullets and needles, and occasionally for studying the action of the heart, since by use of a sufficiently powerful apparatus a shadow of the entire human skeleton can be produced and even the beating of the heart can be seen. Caution should be exercised in using X-rays, since any tissue is injured by too long an exposure to them.

Wilhelm Konrad Roentgen (1845–), the discoverer of the Roentgen rays, was born near Zurich, Switzerland, and educated at Utrecht. He held several important educational positions, previous to 1879, when he was elected professor of physics at the University of Wurzburg, Bavaria. There in 1895 he discovered the rays which gave him a worldwide reputation.

ROGERS, JOHN (1829–1904), an American sculptor, born in Salem, Mass. He was educated at Rome and Paris, but returned to the United States where he first gained

prominence by his sculpture *The Slave Auction.* During the Civil War he executed several small groups of war subjects, which became very popular, but he is more widely known by his groups representing scenes in American life. Among his most popular groups are *John Alden and Priscilla, The Town Pump, Going for the Cows* and *The Charity Patient.* These have been extensively reproduced in bronze, and in casts for schools. The statue of General Reynolds in front of the City Hall, Philadelphia, is one of his most celebrated large works.

ROGERS, Randolph (1825–1892), a famous American sculptor, born at Waterloo, New York. He engaged in business in New York and Ann Arbor, Michigan, and in 1846 he went to Rome, where he studied for four years with Bartolini and other sculptors. Upon his return he acquired a reputation. His statues, *Nydia, the Blind Girl of Pompeii* and *Boy and a Dog,* among them, are worthy of high praise. From 1855 until his death he lived in Italy. He designed and modeled the bronze doors of the addition to the Capitol at Washington, built in 1855, and he made the figures of Marshall, Mason and Nelson for the Richmond (Va.) Washington Monument. His most celebrated works are the colossal statue *America* (Providence, R. I.), *Genius of Connecticut* (Hartford), and a figure representing the state of Michigan (Detroit). He also made the great statue of Lincoln in Philadelphia.

ROHLFS, *rolfs,* Anna Katharine Green (1846–), an American story writer, who since the publication of *The Leavenworth Case,* in 1881, has written more than fifty other detective stories, a larger number than any other American author has produced. She was born at Brooklyn, N. Y., educated at Ripley College (Vt.), and was married, in 1867, to Charles Rohlfs. Among her latest books are *The House of the Whispering Pines, Initials Only, Masterpieces of Mystery* and *Golden Slipper and Other Problems for Violet Strange.*

RO'LAND, a celebrated hero of the romances of chivalry. According to story, he was a nephew of Charlemagne, in whose army he fought against the Saracens in Spain. He was a brave, unsuspicious, loyal warrior, of simple disposition. According to the *Song of Roland,* an old French epic, he was killed at the Battle of Roncesvalles, after a desperate struggle with the Saracens, who had attacked Chalemagne's rear guard. In Italian literature he is known as Orlando. Boiardo's celebrated romantic epic *Orlando Innamorato* and Ariosto's *Orlando Furioso* are stories of Roland and his exploits.

ROLAND DE LA PLATIERE, *ro lahN' de la platyair',* Marie or Manon Jeanne Philipon, Madame (1754–1793), a Frenchwoman who was very prominent during the early part of the French Revolution. She was precocious from childhood and delighted especially in philosophical and ethical works. She married, in 1780, Jean Marie Roland de la Platière. Shortly after the outbreak of the Revolution, her home became the meeting place for the Girondist leaders, and she was active in support of the Girondists, even after they lost their influence. In June, 1793, she was thrown into prison, and in November of the same year she was executed. Just before her execution she uttered words that have become historic: "O Liberty! what crimes are committed in thy name!" During her imprisonment she wrote memoirs.

ROLFE, John (1585–1622), one of the early English colonists in America, celebrated as the husband of the famous Indian Princess Pocahontas. When Rolfe landed in Virginia, in 1610, he saw Pocahontas at Jamestown, where she was held as a hostage by the deputy-governor for the purpose of bringing her father, the powerful chief Powhatan, to terms. Rolfe married her and took her to England. One son was born to them, and his descendants have figured prominently in Virginia history. John Rolfe is said to have been the first white man to cultivate tobacco. See Pocahontas.

ROLFE, William James (1827–1910), one of the greatest of American authorities on the life and works of Shakespeare, was born in Newburyport, Mass., and was graduated at Amherst College. After completing his college work he became head master of schools at Dorchester, Lawrence, Salem and Cambridge, and from 1904 to 1906 was president of Emerson College of Oratory, Boston. His first Shakespearean work appeared in 1867; among his productions are *Shakespeare the Boy; Life of Shakespeare; Shakespeare Proverbs,* and *Life of William Shakespeare.*

ROLLER, a strange Old World bird, named for its habit of tumbling in the air while flying and for tossing its food above its head and catching it on its descent.

Monks of the Middle Ages

ROMAN CATHOLIC CHURCH, that body of Christians which accepts the Pope as its visible head. Roman Catholics believe that the Church was established by Jesus Christ and committed to Saint Peter as the chief of the Apostles, to whom he gave the keys of the Kingdom of Heaven. They believe it to be the only Church of Christ, beyond whose pale there is no salvation. The word *pale*, however, according to Roman theology, includes those of other Christian churches who understand and live in accordance with the precepts and teachings of Christ. The power bestowed by Christ upon Saint Peter is believed by Catholics to descend to his successors to the end of time, and is vested in the Pope as high pontiff of the Church.

Creed and Sacraments. The creed, or belief, of Catholics is defined in the Apostles' Creed, the Nicene, the Athanasian and, most minutely, in that of Pius IV, after the proclamation of the Council of Trent in 1562. The Church has seven sacraments, which are believed to impart spiritual grace, three of which can be taken advantage of but once namely, baptism, confirmation, and holy orders. The ceremonial of the mass is regarded as the most sacred and solemn in the ritual of the Church. In it Catholics believe that the body, blood, soul and divinity of Jesus Christ are really present in the bread and wine, and that this form of worship was ordained by Christ at his Last Supper with his Apostles and has continued to the present time.

Further Beliefs and Ceremonies. Catholics believe that Mary, the mother of Christ, can obtain for them innumerable spiritual benefits, if they appeal to her. They believe that in her conception she was immaculate. Notwithstanding the fact that divine worship is denied to her, she is honored beyond any of the other saints. Her invocation and that of the other saints is prescribed in the Creed of Pius IV, which also imposes reverence for images of them, such as statues or pictures. After the Virgin Mary, Saint Joseph is the most honored of all the saints.

A place of purification after death, known as purgatory, is also believed in by members of the Roman Church. Those dying penitent, but not wholly cleansed from sin, make full atonement in purgatory, after which they are admitted into heaven.

The Pope. The definition of the Church, as understood by Catholics, is a congregation of all the faithful under the supremacy of the Pope, who has been pronounced infallible. His infallibility, however, is limited to questions of doctrine and faith, which have been or would be defined by councils of the Church, composed of cardinals and other ecclesiastical hierarchs.

Priesthood. All entering the priesthood must assume the vow of celibacy before admission to holy orders, according to the law of the Western Church. There is, however, no apostolic obligation on the Church to impose celibacy as an indispensable qualification for the priesthood, but it is regarded as an important quality, since those in a married state would not give their attention wholly to spiritual duties. Gregory the Great and the Council of Toledo in 653 prohibited marriage by those in holy orders. Persons in minor orders, though married, were for centuries allowed to serve the Church. In the twelfth century minor priests at marriage were deprived of clerical privileges. Boniface VIII, in 1300, permitted them to act as clerks, provided they had the sanction of the bishop. The Council of Trent subsequently pronounced such marriages null and void. In the East, clerical celibacy existed in Thessaly, Achaia and Macedonia in the fifth century. When Synesius in 410 was elected bishop of Rome, he accepted the office only on the condition that he be allowed to live with his wife. The consequences of various laws on the question are that Greeks who aspire to the priesthood leave the seminaries and return for ordination after marriage; that secular priests can live in the married state, but on the death of a wife cannot take a second, and that bishops are chosen from the monks. All monks and nuns must be celibates.

Related Articles: Consult the following titles for additional information:

GENERAL

Abbot
Absolution
Antipope
Archbishop
Ave Maria
Benedictines
Bishop
Breviary
Bull
Canon Law
Canonization
Capuchins
Cardinal
Carthusians
Censer
Charity, Sisters of
Conclave
Concordat

Counter-Reformation
Dominicans
Eucharist
Franciscans
Hermits
Hierarchy
High Priest
Holy Water
Holy Week
Index Expurgatorius
Indulgence
Innocents, Feast of Holy
Jesuits
Litany
Liturgy
Magnificat
Mass
Mendicant Orders
Mercy, Sisters of
Missal
Monasticism
Monk
Nun
Nuncio
Paulists
Penance
Pope
Priest
Purgatory
Rosary
Sacrament
Sacred College
Unction
Ursulines
Vatican Council

BIOGRAPHY

Ambrose, Saint
Aquinas, Saint Thomas
Augustine, Saint
Barbara, Saint
Becket, Thomas á
Begin, Louis Nazaire
Bernard, Saint
Boniface, Saint
Cecilia, Saint
Falconio, Diomede
Farley, John Murphy
Francis of Assisi
George, Saint
Gibbons, James
Ignatius, Saint
Ireland, John
Lanfranc
Loyola, Saint Ignatius of
Manning, Henry Edward
Mercier, Honoré
Merry del Val, Rafael
Mundelein, George W.
Newman, John Henry
Nicholas, Saint
O'Connell, William H.
Patrick, Saint
Ryan, Abram Joseph
Sebastian, Saint
Tertullian
Theresa, Saint
Thomas à Kempis
Valentine, Saint
Veronica, Saint
Xavier, Francisco

ROMANCE, *ro mans'*, a fictitious narrative in prose or verse, the interest of which turns either upon marvelous or uncommon incidents. The name is derived from the class of languages in which such narratives in modern times were first widely known and circulated —the French, Italian and Spanish, called the *Romance languages.*

The ancient Greeks manifested great love for stories of adventure, which were the forerunners of the modern romance. The most representative of these are the *Iliad* and the *Odyssey.* The earlier medieval romances of Western Europe were metrical and may be divided into two classes: the popular epics, chanted by strolling minstrels, and the more elaborate and artificial poems, composed and sung by the court poets. Both classes were based on more ancient lays, treating of celebrated heroes, frequently mingled with pagan myths and with connecting passages composed by the reciters. Thus originated a series of epics, grouped around some renowned hero and forming a cycle of romance.

The romances of French origin form a large and interesting body of literature, some attaining a length greater than 20,000 lines. These romances were sung by wandering minstrels to the sound of a kind of violin. Many of the reciters wrote their own chansons, others bought copies from the original composers. The romances of the Arthurian cycle owe their origin to the lays of the Welsh bards, supposed to be as old as the sixth and seventh centuries, but they are directly based on the Latin *History* of Geoffrey of Monmouth, which was versified in French by Wace (1155–1158) and was amplified and translated into English by Layamon, about 1204. The Arthurian romance spread from France to Provence, Spain, Italy and the Netherlands, and was again transplanted into England. It is through Malory's *Morte d'Arthur* (1485), a prose version of the tales, that it came down to later times.

The favorite heroes of romance, besides Arthur, were Charlemagne, Roland, Alexander, Richard Lion-Heart and Guy of Warwick. In addition to romances dealing with these, we find also a class in which exploits of Teutonic heroes are celebrated, as the Anglo-Saxon or Anglo-Danish *Beowulf,* the old German *Nibelungenlied* and the romance of *Havelok the Dane.* The poetical romance was superseded by the prose romance, the transformation of metrical into prose romances being due in part to the invention of the art of printing, by which the necessity of meter for purpose of recital was done away with. The prose narratives, which, like those in verse, celebrated Arthur, Charlemagne, Amadis de Gaul and other heroes of chivalry, had a definite part in the development of the novel. See NOVEL.

ROMANCE LANGUAGES, the languages of Southern Europe which owe their origin to Latin. These languages were not based on literary Latin, such as is found in the classics, but on the everyday speech of the Romans; for it was the soldiers, tradesmen and artisans who carried the Roman language into the conquered territories of Rome. This Latin was much modified wherever it was introduced, and in time a new tongue grew up in each case where the Romans had grafted their language on native speech.

ROMAN LAW. See CIVIL LAW.

ROMAN LITERATURE. See LITERATURE, subhead *Latin Literature.*

ROMAN NU'MERALS, the number symbols used for numbering the dials of clocks, the volumes in a set of books, the pages of prefaces and for various other purposes, are the symbols which were employed by the Romans in their arithmetical computations. The system is very simple, but it has for centuries been replaced by the Arabic, which is more convenient to write (see ARITHMETIC).

The system doubtless originated from counting on the fingers, as *I* for one, *II* for two, *III* for three, *IIII* for four. Then it became customary to write five with four vertical lines and a slant line across them. Probably from this device the use of *V* for five was evolved. Two V's placed point to point form *X* the symbol for ten. *C*, the initial for *centum*, meaning *hundred*, stands for 100, *M*, the initial for *mille* one thousand, is the symbol for that number. *L* is the symbol for fifty and *D* for 500. The method of writing is simplified by subtraction. Instead of writing *IIII* for four, it is expressed by *IV*, the small number before the larger indicating that it is to be subtracted; thus we have *XL* for forty and *MCM* for 1900.

ROMANOFF, *ro'man awf*, the name of the family that ruled Russia from 1613 to 1917. Feodorovitch Romanoff, of the royal house of Rurik, was chosen by the half-barbarous nobles of Russia ruler of the country in 1613, and was given the title of *czar*. Nineteen Romanoffs in succession continued to rule Russia, until the last, Nicholas II, was deposed in 1917. Only two of this number won distinction by their statesmanship; these were Peter the Great, who found Russia almost disorganized and developed it into a strong nation, and Catherine the Great, who made her country respected in the courts of other nations.

The other rulers pursued a narrow policy that shut Russia from the rest of the world. Under them Russia was ruled by autocratic officials who oppressed the people and stamped out with utmost cruelty any attempt on part of the common people to have a voice in the government. Their influence was so strong that no legislative body was tolerated until early in the twentieth century, and then for several years it was not permitted to exercise any power. But the people were gradually gaining political strength, and finally, exasperated over conditions brought about by the World War, on March 15, 1917, the Duma, or Russian national legislative assembly, compelled Czar Nicholas II to abdicate. He named his brother Michael his successor, but the latter refused to assume the responsibility unless it was the people's will, and the rule of the Romanoffs came to an end.

The members of the Imperial family were imprisoned in the Tsarkoe-Selo Palace. Later they were removed by the Bolshevik government to Tobolsk, Siberia, then to Ekaterinburg, where the ex-czar was executed by order of the Bolsheviks, probably on June 16, 1918. See NICHOLAS II.

RO'MANS, EPISTLE TO THE, the most elaborate and important letter of Paul the Apostle. It was written at Corinth, A. D. 57 or 58, and expressed Paul's desire to visit Rome. The burden of the letter was the Apostle's doctrine of justification by faith, through which he showed how the Christian dispensation was extended alike to Jews and Gentiles. This doctrine was accepted by Luther as the foundation of his system, and it is one of the most important articles in the creeds of Protestant Churches.

ROMANTICISM, *ro man'ti siz'm*, in the literature of Western Europe, the name given a movement having for its purpose the rise and development of imagination and sensibility in both the prose and poetry. Romanticism indicated the tendency of ninteenth-century authors to free literature from the Greek and Roman formalism which had for many years considered form of greater importance than thought and sentiment. At the beginning of the movement Pope was considered the greatest English poet, because of the correctness of his verse. James Thompson in 1727–1730 published his *Seasons*, in which for the first time attention was given to nature. This poem may be considered as the first to attract attention to the new movement.

Gray's *Elegy*, Goldsmith's *Deserted Village* and Cowper's *Task* gave impetus to the movement, which later reached its height in Scott, Byron, Shelley, Keats, Wordsworth, Coleridge and Burns. In Germany the leaders in the opposition to classic ideals in literature were Lessing and Herder; Goethe's *Sorrows of Werther* is one of the extreme products of the movement. But the name *Romantic School* is usually given in Germany to the group of which the chief members were the brothers Schlegel, Novalis, Tieck, Schelling and Schleiermacher. Victor Hugo, by the publication of his *Odes and Ballads*, in 1826, and of his *Cromwell*, shortly afterward became the leader of the romantic movement in France.

ROMAN WALLS, walls constructed by the Romans, on the northern boundary of Britain, to protect the country from incursions of the Picts and Scots. The Wall of Hadrian, built A. D. 120, extended between the Tyne and the Solway. The wall was strengthened

by Severus, and is often called the Wall of Severus. The Wall of Antoninus, built in 139, extended between the Forth and the Clyde rivers. It marked the northern boundary of Roman dominion. Portions of these walls are still in a good state of preservation.

In the Forum

ROME, the capital of the modern kingdom of Italy, a city possessing glorious traditions and a history reaching far back into antiquity. Over seven centuries before Christ, so the story goes, a settlement was made on one of seven hills extending along the left bank of the Tiber River, about fifteen miles from the sea. In course of time the neighboring elevations were peopled, and eventually the settlements united to form the Rome of history, a city great and powerful, ruling the world from its seven hills. The Rome of to-day is a religious center of the Western Christendom and the residence of the Pope, and in many respects it is like other modern cities. Yet its wonderful ruins, a priceless heritage from the past, are ever there to suggest the city of the ancient republic and the world empire.

Ancient Rome. During the many hundred years of Rome's existence its appearance and condition changed repeatedly, but it is best known as it appeared during the reign of Emperor Augustus, when it was at the height of its splendor. Of this ruler it was said that he "found a city of wood and left one of marble." The streets were crooked and narrow, but splendid public buildings, such as temples, porticoes, theaters and baths, gave parts of it an appearance of wonderful beauty. At that time the population is supposed to have been more than a million, and in the time of Trajan it was not far short of two million.

Ancient Rome was surrounded by high walls, the Tiber was spanned by eight or nine bridges, and within the walls were open places, or parks, covered with grass and trees. Several paved spaces, surrounded by imposing buildings, were the places of public meeting, and of such the *Forum Romanorum,* which lay between the Capitoline and Palatine hills, was chief, although the Forum of Trajan was more splendid. The central street of the city was the *Via Sacra,* or Sacred Way, which, beginning at the base of the Capitoline Hill, ran along the Forum by the Colosseum and to the space between the Esquiline and Caelian hills. The two principal roads leading out of Rome were the Flaminian Way, or Great North Road, and the Appian Way, or Great South Road. The oldest and most sacred temple was that of Jupiter Capitolinus, on the Capitoline Hill. The Pantheon, a temple of various gods, was a great circular building with a dome roof, 140 feet wide and 140 feet high. It was a marvel of construction, and so well was the work done that the Pantheon is still in excellent preservation.

Other temples built at various times were the white marble Temple of Apollo, on the Palatine; the Temple of Minerva, which Pompey built and which Augustus covered with bronze; the Temple of Peace, once the richest and most beautiful in Rome; the Temple of the Sun, and the magnificent Temple of Venus, which Caesar caused to be built to her. The principal imperial palaces were on the Palatine Hill. The most magnificent of the amphiteaters was that of Titus, completed in A. D. 80, and now known as the Colosseum. The Circus Maximus, between the Palatine and the Aventine, and the theaters of Pompey and Marcellus, were all celebrated for their size and elegance. The public baths of Rome were numerous, and some of them were enormous buildings, splendidly decorated and furnished. Extensive ruins of the baths of Caracalla and of Diocletian still remain and testify to the luxury with which the pleasure-loving Romans surrounded themselves.

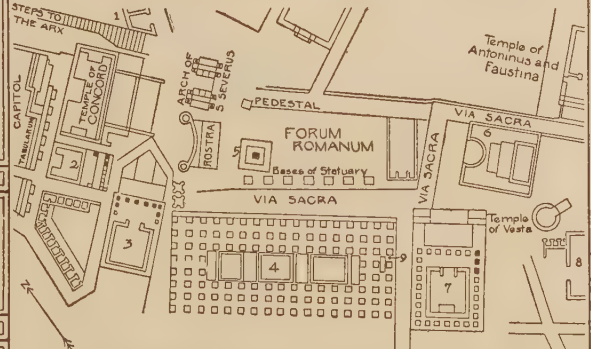
Rome was decorated with triumphal arches and beautiful columns, built at various times. In the corner of the Forum may still be seen the great Arch of Septimius Severus; at the other end is the beautiful Arch of Titus, and nearer the Colosseum is the well-preserved Arch of Constantine. Trajan's beautiful pillar, 117 feet high, still stands among the ruins of his Forum. A spiral panel, running from top to bottom, shows in relief the triumphs of Trajan, and furnishes to modern scholars the best illustrations of the costumes and habits of the epoch. Within, a flight of stairs gives access to the top of the pillar. Magnificent tombs were located here

ROME

"The Eternal City"

PLAN OF ANCIENT ROME

1 Capitoline Hill
2 Arx
3 Comitium
4 Mamertine Prison
5 Via Sacra
6 Via Triumphalis
7 Palaces of the Caesars
8 Colosseum
9 Lateran
10 Hadrian's Tomb
11 Circus Maximus
12 Forum



PLAN OF THE ROMAN FORUM AND THE SURROUNDING BUILDINGS

1 Mamertine Prison
2 Temple of Vespasian
3 Temple of Saturn
4 Basilica Julia
5 Column of Phocas
6 Temple of Julius Caesar
7 Temple of Castor and Pollux
8 House of the Vestals
9 Cloaca Maxima

BATHS OF CARACALLA.
A most magnificent building nearly one mile around. Accommodations for 1600 bathers.

INTERIOR OF A ROMAN HOUSE

TOMB OF HADRIAN, BUILT BY HIMSELF

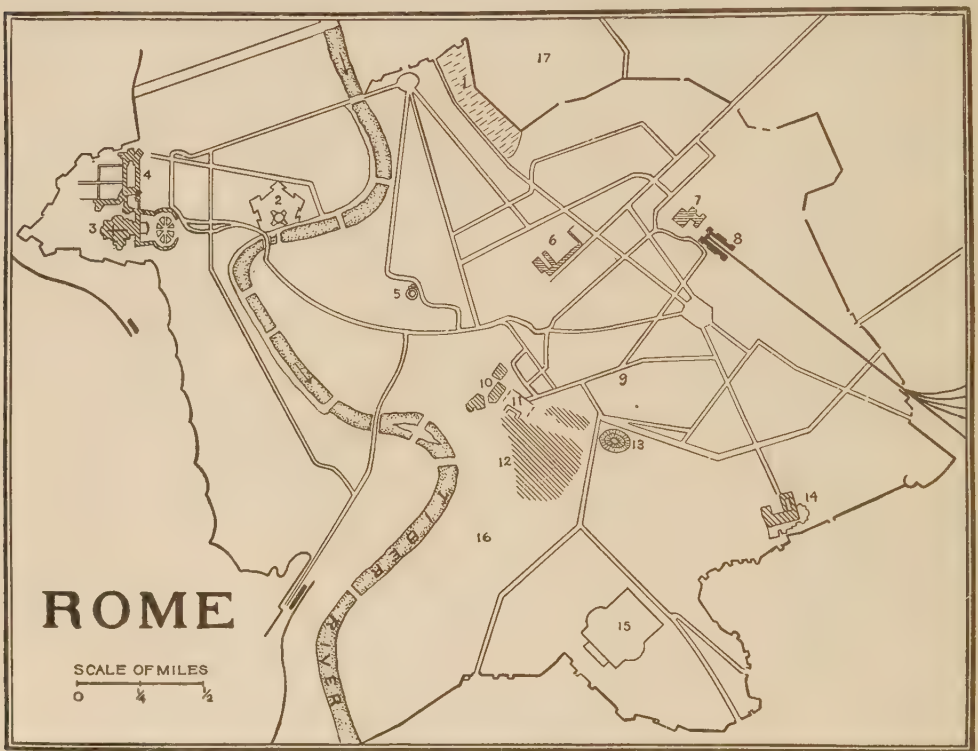
THE COLOSSEUM

H. M. HAINES

and there throughout the city, chief among which were the Mausoleum of Augustus and the noble tomb of Hadrian, still standing on the west bank of the river and known as the Castle of Saint Angelo. Only passing mention can be made of the rich private dwellings of the nobility, crowded with treasures of art, which ornamented the more favored parts of the city.

Modern Rome. Since Rome became the capital of modern Italy it has been improved in cleanliness and general healthfulness; it has been given excellent systems of electric railways, wide new streets and whole sections of fine modern buildings, so that it is an attractive city, aside from its historical associations. The city is surrounded by a wall and is entered by twelve gates and several openings through which railways pass. The wall on the east bank occupies the lines laid down by Aurelian in the third century, but the west wall was not built until the seventeenth century. There are ten fine bridges across the Tiber within the city, and great stone embankments keep the treacherous stream within its banks and prevent the lower parts of the city from being flooded, as they were in former times.

Among the principal squares of modern Rome is the Piazza del Popolo, on the north side of the city, near the Tiber, from which the three principal streets of the city diverge. Another street crossing the river leads to the Vatican and the Church of Saint Peter's, which occupy conspicuous positions on the hills. The Quirinal, or the king's palace, is situated on an eminence near the center of the city. The Capitoline Hill is still crowned by the Capitol and two large museums on the sides of a little central court, in which is the equestrian statue of Marcus Aurelius. The appearance of the hill, however, has been much changed of late by the erection of a great monument to Victor Emmanuel. The Palatine Hill is a mass of ruins which, with the territory immediately surrounding it, is still the subject of continued excavations, which are from time to time revealing re-



1, Pincian Hill; 2, Hadrian's Tomb; 3, Saint Peter's; 4, Vatican; 5, Pantheon; 6, Quirinal (Royal Palace); 7, Baths of Diocletian; 8, Railway Terminal; 9, Column of Trajan; 10, Capitol; 11, Forum; 12, Palatine Hill; 13, Colosseum; 14, Lateran; 15, Baths of Caracalla; 16, Aventine; 17, Villa Borghese.

markable remains of ancient Roman splendor. The Forum has been excavated and contains many fragments that show the beauty of its statuary and other decorations. Rome is filled with beautiful churches, of which the greatest are the Church of Saint Peter's and the Cathedral of Saint John in Lateran, the latter in an isolated locality near the south wall of the city. There are beautiful parks and fine drives through the city, especially on the Janiculum, a hill extending along the west bank of the river. The Pincian Hill, near the Piazza del Popolo, is laid out with gardens and beautiful drives, and is a favorite afternoon resort.

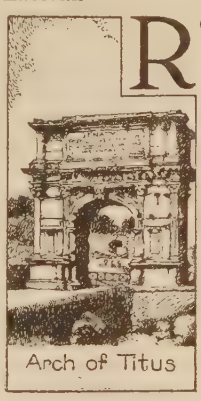
Outside the walls near by are the Borghese gardens and the palace, celebrated for its picture gallery. Other private palaces within the city contain fine collections of paintings, most of which have been secured by the Italian government. Public museums and picture galleries are numerous, and in them are guarded the treasures of art from early times to the present. Among them the Vatican may be considered the greatest, with its unrivaled collections of statuary and paintings, but the Capitoline Museum contains some of the most famous statuary of the world.

Educational institutions abound, among which the University of Rome ranks first. The *Collegio Romano,* formerly a Jesuit college; the *Collegio de Propaganda Fide,* an establishment where Roman Catholic missionaries are trained; the American School of Classic Languages, and several other institutions for training in art, science and literature register numerous students. There are several great libraries, modern theaters, hospitals and other public and charitable institutions, such as are found in most cities, though all are more or less affected by the historic importance of the city and the fact that it is the center of interest for travelers the world over. This affects also the trade of the city, which is externally unimportant, as the river can be navigated only by small craft, while railway facilities are limited. However, woolen and silk goods, artificial flowers, jewelry, earthenware and objects of art are manufactured, and trade in these is considerable.

From the downfall of the Roman Empire, the history of Rome is included in that of the Papacy. In 1527 the city was captured and sacked by the troops of the Constable of Bourbon; in 1798 it was occupied by the French; in 1848 Pius IX was driven from Rome and a Roman republic was formed, under Mazzini and Garibaldi. A French army sent to the Pope's assistance captured Rome in July, 1849, and under the protection of the French, the Pope ruled until October, 1870, when Rome was occupied by the Italian troops. In June, 1871, the "Eternal City" became the capital of United Italy, and the king took up his residence in the Quirinal. Population, 1911, 542,123; in 1917, 570,960.

Related Articles. For description of important structures of ancient and modern Rome consult the following titles:

Appian Way
Arch
Campus Martius
Capitol
Caracalla, subhead Baths of Caracalla
Circus
Colosseum
Forum
Lateran
Pantheon
Saint Peter's Church
Septimius Severus, Arch of
Titus, subhead Arch of Titus
Trajan, subheads Arch of Trajan; Trajan's Column
Vatican


Arch of Titus

ROME, HISTORY OF. The origin of Rome is connected in legend with the Trojan War, through Aeneas, who was led by the will of the gods to Italy. His son Ascanius founded Alba Longa, which placed itself at the head of the league of Latin cities. About 400 years after the founding of the city, Romulus and Remus, the grandsons of Numitor, king of Alba Longa, founded a new city on the Palatine, one of the seven hills on the left bank of the Tiber (753 B. C.). In a quarrel over the name and government of the city, Remus was slain by his brother, who became the first king of Rome. To hasten the growth of his new city, Romulus made it a place of refuge, to which he invited the lawless and discontented from the surrounding country. As neighboring tribes refused to allow their women to marry the Romans, Romulus secured wives for them by the so-called *rape of the Sabines.* The war with the Sabines, to which this led, was ended by the intercession of the women, and the Romans and Sabines united to form a single nation.

Period of the Kings. In prehistoric Italy there were numerous tribes, the most important of which were the Latins. Rome subdued the less important cities of Latium one after

another, and the inhabitants moved to Rome, where they formed the plebeian class, which was without political rights. At the head of the government of Rome was the king, who was elected by the people, and next to him was the Senate, composed of three hundred members. A popular assembly, which included the heads of all the families, had the right to make laws, decide upon peace and war and confirm the election of the king. Tradition gives as the names of the kings of Rome who succeded Romulus; Numa Pompilius, Tullus Hostilius, Ancus Martius, Tarquinius Priscus, Servius Tullius and Tarquinius Superbus, the last of whom reigned until 509 B. C. The period of the kings was occupied largely with contests between the patricians and plebeians, as a result of which the latter gained certain privileges. The last king, Tarquinius Superbus, by his acts of oppression so angered the people that they rose against him and drove him from the state, declaring that henceforth the supreme power should be held by no one for life. Rome was declared a republic, and at the head of the new government were placed two magistrates, called consuls, chosen for one year and possessing powers which were almost identical with those of the early kings.

Republic Formed. The first two or three hundred years of the Republic were marked by bitter contests between the patricians and plebeians. The first step toward equality and protection for the plebeians against the patricians was the creation in 494 of the office of tribune, which the plebeians secured by withdrawing from the city and refusing to return until concessions were granted. Another demand which the plebeians made was that the laws, which hitherto had not been written down, should be codified and put in such a form that any one might acquaint himself with them. The result of this was the appointment of the decemvirs and the preparation of the Law of the Twelve Tables, upon which all subsequent Roman jurisprudence was based. A law legalizing intermarriage between the plebeians and patricians equalized the two orders socially, and the demand of the lower class for admission to the consulship resulted in a compromise—the election of military tribunes, with consular power, who might be from either order. Of the questors, who were first elected in 447, it was provided that two might be plebeians, and in 367 the *Licinian Law* not only admitted plebeians to the consulship, but declared that one of the consuls must be a plebeian. To offset this advantage, the patricians secured the new office of praetor, but the praetorship also was soon opened to the plebeians.

Early Wars. Externally this period was marked by numerous wars. The neighboring tribes, which had made treaties with the king of Rome, regarded their allegiance as ended by his expulsion, and certain Etruscan tribes, with Lars Porsena of Clusium at their head, aided Tarquin in his vain attempts to recover his throne. Chief of the wars in which Rome engaged against the neighboring tribes were those against the Veientines, the Volscians and the Aequians. In 390 B. C. the Gauls under Brennus invaded Roman territory from Northern Italy and captured Rome, which they plundered and burned, but failed to take the citadel, which was heroically defended by Manlius for seven months.

In its progress southward, Rome came into collision with the Samnites, and a contest for the mastery of Italy began which lasted for over fifty years (343–290), with occasional interruptions. In spite of some defeats, the Romans were ultimately successful, and firmly established their supremacy over the Samnites. Rome's progress in the East was opposed by the Tarentines, who called to their aid Pyrrhus, king of Epirus. Pyrrhus was in the end defeated and compelled to leave Italy, and the supremacy of Rome in Southern Italy was secured.

The Punic Wars. Rome next came into collision with Carthage, the most powerful foe thus far encountered. The two peoples had had a treaty of alliance since 348, but it was of little significance, and the jealousy with which each viewed the progress of the other grew, until in 264 B. C., on a slight pretext, war was declared. Between the close of the first Punic War (241) and the outbreak of the second (218), both Rome and Carthage were busy strengthening their resources. The final result, however, was the same as that of the first war, and Carthage lost to Rome all its colonies and was obliged to pay a large annual tribute.

Conquest of Greece and Spain. Rome's next wars of conquest were in the East. The first Macedonian War (214–205) accomplished little, as Rome was at the time engaged in the struggle with Carthage, but the second ended with the complete defeat at

ROME

The Legendary Period
753-509 B.C.

ANCIENT ITALY

CHRONOLOGICAL SUMMARY

	B.C.
Founding of Rome, about	753
Numa Pompilius	716
Tullus Hostilius	672
Ancus Martius	640
Lucius Tarquinius	616
Servius Tullius	578
Tarquinius Superbus	534
Expulsion of the Kings	509

PART OF THE WALL OF ROME. SAID TO HAVE BEEN BUILT BY ROMULUS.

COIN SHOWING PROW OF SHIP

THE TARPEIAN ROCK (FROM AN OLD PRINT)

ROMAN DOMESTIC ALTAR

A VESTAL VIRGIN

ROMAN CHARIOT OF THE SEVENTH CENTURY B.C.

H.M.HAINES

Cynoscephalae, in 197 B. C., of Philip V of Macedon. In 172 the Greeks united under Perseus, the new king of Macedonia, and the third Macedonian War followed, which was ended by the decisive victory of the Romans at Pydna (168). Twenty years later the Achaean League attempted a revolt, and Roman armies promptly marched into Greece, put down the rising and converted Greece into a Roman province (146 B. C.). This same year marks the close of the third Punic War (149–146), which consisted merely in the siege and heroic defense of Carthage. The splendid city was destroyed, and Africa became a Roman province. In Spain an obstinate war had been carried on by the Celtiberians, but the country was finally subdued in 133.

Decline of the Republic. The last century of the Roman Republic was marked by incessant civil dissensions. In spite of the nominal equality in the civil and political rights of the two orders, the government was exclusively in the hands of the nobility, and the Senate ruled with almost sovereign power. Attempts were made to better the condition of the plebeians, but little was accomplished. From the death of the younger Gracchus, in 121, a corrupt aristocratic government ruled. The honor of the Roman state had sunk so low that when Jugurtha, king of Numidia, revolted and usurped the neighboring territory, which was under the Roman protectorate, the commissioners sent to investigate and the army dispatched to subdue him were readily won over to his side by bribes. At length, however, the war against Jugurtha was taken up and brought to a successful close by Caius Marius (106).

Rome was now threatened from the north by two Germanic nations, the Cimbri and the Teutones, and this danger also Marius averted. In 91 B. C. began a fierce struggle known as the Social War, in which the Latins and the various Italian peoples contended for the rights of Roman citizenship, which belonged only to the inhabitants of the capital and of Roman colonies. Although generally victorious, Rome wisely ended the strife by granting the privileges demanded. In this Social War, Marius and Sulla fought side by side, but jealousy between them was constantly growing, and when, in 88, Sulla was chosen as a leader in the war against Mithridates, king of Pontus, the result was civil war. The war with Mithridates was a long and stubborn contest, but it was finally brought to a close in 65 B. C. by the defeat of Mithridates by Pompey. The Catiline conspiracy, which broke out in Rome in 63 B. C., was put down only by the vigilance and genius of Cicero.

For the next twenty years, the history of Rome is the biography of the men who in 60 B. C. formed the famous first triumvirate—Caesar, Pompey and Crassus. After the death of Caesar, his assassins did not receive the public approval which they had expected, and the chief power of the state fell into the hands of Mark Antony. After several years of struggle, a second triumvirate was formed, consisting of Octavius, Antony and Lepidus. When his rivals were removed, Octavius was able to establish under republican forms an absolute and perfect monarchy. In 29 B. C. he received the supreme power for life.

The Empire. During the first 200 years of the Empire, the forms of constitutional government were generally observed. The oppression of occasional tyrants, as Tiberius and Nero, affected chiefly the capital, the provinces being usually unmolested and well governed. Tiberius (14–37) first ruled with wisdom and moderation, but afterward became suspicious, cruel and tyrannical. During this reign occurred the preaching and crucifixion of Jesus Christ. Tiberius was followed by three other emperors of the Claudian house, Caligula (37–41), Claudius (41–54) and Nero (54–68). One of the most important events during this period was the conquest of Britain, during the reign of Claudius. Under Nero occurred the burning of Rome, which was followed by a cruel persecution of the Christians.

After the three short reigns (68–69) of Galba, Otho and Vitellius, the favorite commander Vespasian (69–79) was chosen emperor. His reign and that of his son Titus (79–81) were notably prosperous and free from tyranny. It was during the reign of Titus that the eruption of Vesuvius occurred, by which Pompeii and Herculaneum were destroyed. Diocletian (81–96), the last of the twelve Cæsars, was followed by the "five good emperors," Nerva, Trajan, Hadrian, Antoninus Pius and Marcus Aurelius, whose reigns were happy and prosperous. Under Trajan, the Roman Empire extended its boundaries to the farthest limits attained in its history. Hadrian, realizing that the Em-

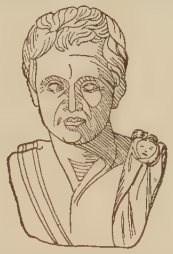
ROMAN DOMAIN (IN BLACK) 64 B.C.

ROME

The Republic

509-31 B.C.

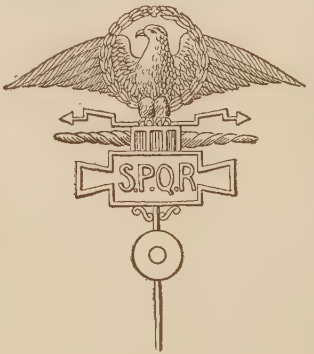
•CHRONOLOGICAL SUMMARY•	B.C.
Republic Established	509
Sack of Rome by the Gauls	390
The Samnite Wars	343-290
The Punic Wars	264-146
The Macedonian Wars	215-168
The Mithridatic Wars	88-63
Julius Caesar	59-44
Battle of Philippi	42
Battle of Actium	31


POMPEY THE GREAT

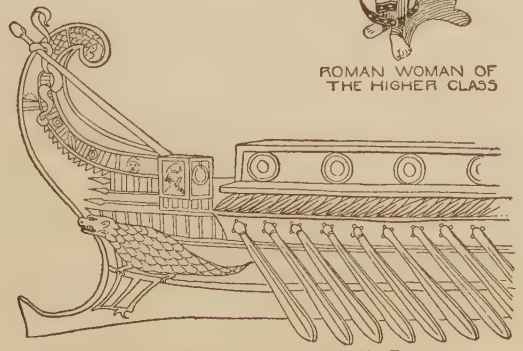
ROMAN WOMAN OF THE HIGHER CLASS

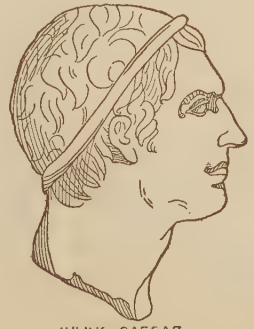
THE APPIAN WAY (AS IT APPEARS TODAY).

A ROMAN SOLDIER



THE ROMAN STANDARD. INSCRIPTION MEANS "THE SENATE AND ROMAN PEOPLE."


PROW OF A ROMAN WAR SHIP


JULIUS CAESAR

DENARIUS OF CAESAR (SILVER)

H·M·HAINES

pire was in danger if its boundaries were extended too far, relinquished the contests which Trajan had made beyond the Danube and beyond the Euphrates. Under Marcus Aurelius occurred the conflict with the Marcomanni, which marked the beginning of the long and desperate struggle of Rome with the German tribes.

With the reign of Commodus (180–192) began the decline of the Roman Empire. This was at first gradual, but incompetent rulers and invincible hordes of barbarians hastened the inevitable fall. Under Septimius Severus (193–211) occurred a change in the attitude of the imperial government toward Christianity, and under his protection this religion began to make rapid progress throughout Roman dominions. Alexander Severus (222–235) gave Rome an able government and sought to check the military supremacy and corrupt tendencies of the time. The period of anarchy (251–268), during which various claimants to the imperial dignity were constantly warring among themselves, seemed about to cause the dissolution of the Empire, but it was saved for a time by the succession of five good emperors, Claudius, Aurelian, Tacitus, Probus and Carus. Of these the most famous is Aurelian (270–275).

With the reign of Diocletian (284–305), the last trace of republicanism vanished, and Rome became an absolute monarchy. This saved the Empire for nearly 200 years more, although the appointment of Maximian to the post of joint emperor began the division of government administration which finally resulted in the separation of East and West. Diocletian is remembered for his terrible persecution of the Christians. This was the last pagan persecution of the Church, for under Constantine the Great (sole emperor, 323-337), Christianity became the state religion. In 330 the capital of the Empire was moved to Byzantium, afterward Constantinople. The division of the Empire among Constantine's sons led to a struggle which lasted till 350, when Constantius became sole emperor. He was succeeded by Julian the Apostate (361-363), so called because of his efforts to restore paganism.

In the reigns of the joint emperors, Valentinian and Valens, the barbarian tribes on the north again became threatening, while in Africa the Moors, and in Britain the Scots and Picts, almost destroyed the Roman supremacy. In 376, after the death of Valentinian, the Visigoths, fleeing from the Huns, were allowed by Valens, who still ruled in the East, to cross the Danube and settle as allies. The agents of the government exasperated them by unfair dealing, and the result was a battle in which the Romans were defeated (378); but under Theodosius the Great (379-395) the Romans succeeded in subduing the Goths.

At the death of Theodosius, the Empire was divided between his sons, Arcadius and Honorius, the latter receiving the West, the former becoming ruler of the Byzantine Empire. Between the East and West, jealousy arose, and one power often saved itself from the barbarians by inducing them to turn their hordes against the other. The Goths under Alaric were defeated by Stilicho, the general of Honorius, first in Greece and later in Italy, but after the death of Stilicho they returned and captured and sacked Rome. Meanwhile, in the provinces, the Roman rule had ended with the withdrawal of the legions to defend Italy. The Visigoths founded a kingdom in Southern France and Spain, and the Vandals took possession of Northern Africa. When the Huns, under Attila, appeared, and after exacting tribute from the Eastern emperor, descended upon Gaul, the united Roman and Gothic armies opposed them at Châlons and defeated them (451). The following year, Attila marched into Italy and threatened Rome, but was induced by the pleas of Leo the Great, the Christian bishop, to spare the city. In 455 the Vandals under Genseric captured the city and plundered it for two weeks. Between 456 and 472 Count Ricimer created and deposed emperors at will.

The last of the Roman emperors, strangely enough, bore the name of Romulus, but was surnamed Augustulus. In 476 Odoacer dethroned this child emperor and took the title of king of Italy; he thus brought the Roman Empire in the West to an end. Rome now became a province of the Byzantine empire and was ruled in theory, sometimes in fact, from Constantinople, until, in 800, the crown of the Western Empire was placed on the head of Charlemagne.

Related Articles. Consult the following titles for additional information:

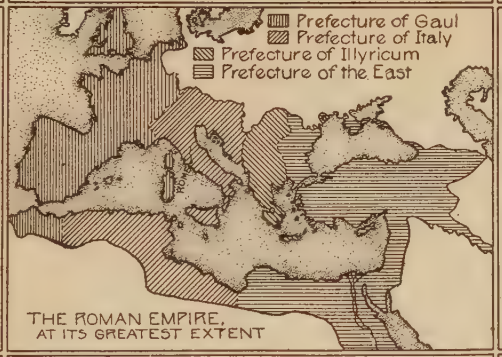
HISTORICAL TOPICS

Agrarian Laws
Atrium
Augurs
Byzantine Empire
Carthage
Censors
Cimbri
Comitia
Consul
Decemvirs
Etruria
Fasces

ROME

The Empire

31 B.C.-476 A.D.

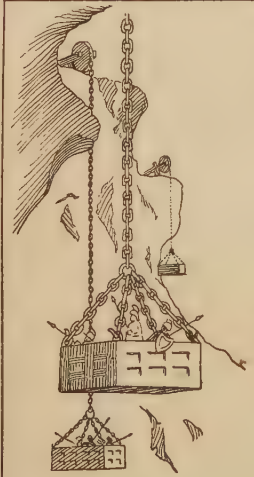


THE ROMAN EMPIRE, AT ITS GREATEST EXTENT

Chronological Summary

	A.D.
Reign of Augustus Caesar, from 31 B.C. to	4
Burning of Rome	64
Jerusalem Destroyed by Titus	70
Destruction of Herculaneum and Pompeii	79
Conquest of Britain	85
Christianity Becomes the State Religion	313
Final Division of the Empire	395
Sack of Rome by Alaric	410
Rome Pillaged by Vandals	455
End of Roman Empire	476

ARCH OF CONSTANTINE


METHOD OF ATTACK FROM ABOVE

MARCUS AURELIUS

COIN OF VESPASIAN

NERO

SHIP WITH SCALING LADDER, FOR ATTACKING A SEA WALL

EMPEROR AUGUSTUS FROM A STATUE IN THE VATICAN

H.M. HAINES.

Gladiator
Goths
Helvetii
Huns
Legion
Lictors
Lupercalia
Patrician
Plebeians
Praetor
Praetorian Guard
Punic Wars
Quæstor
Quirinal
Sabines
Samnites
Saturnalia
Tarpeian Rock
Tiber
Toga
Tribune
Triumph
Triumvirate
Twelve Tables, Law of the

BIOGRAPHY

Agricola, Gnaeus J.
Antony, Mark
Augustus
Aurelian, Lucius
Aurelius, Marcus
Brutus, Decimus
Brutus, Marcus
Caesar, Caius Julius
Caligula
Catiline
Cato, Marcus Porcius
Cicero, Marcus Tullius
Cincinnatus, Lucius
Claudius
Cleopatra
Constantine
Crassus, Marcus L.
Diocletian
Domitian
Galba, Servius
Gracchus
Hadrian
Hamilcar Barca
Hannibal
Jugurtha
Julian
Justinian I
Lepidus, Marcus A.
Lucretia
Marius, Caius
Mithridates
Nero
Nerva
Numa Pompilius
Pompey
Pyrrhus
Romulus
Scipio, Publius C. (father and son)
Seneca, Lucius A.
Servius, Tullius
Sulla, Lucius C.
Tarquinius, Lucius
Theodoric
Theodosius
Tiberius
Titus
Trajan
Valens
Valentinian I
Valentinian III
Vespasian

LITERARY REFERENCES

Aeneid
Caesar, Caius Julius
Cicero, Marcus Tullius
Horace
Justinian I
Livy
Plautus
Pliny
Quintilian
Tacitus, P. C.
Terence
Vergil

ROME, Ga., the county seat of Floyd County, seventy-two miles northwest of Atlanta, on the Oostanaula and Etowah rivers, where they unite to form the Coosta, and on the Central of Georgia, the Nashville, Chattanooga & Saint Louis, the Western & Atlantic, the Rome & Northern and several lines of the Southern Railroad. It is one of the growing industrial cities of the South, and it contains cotton and hosiery mills, machine shops, an iron furnace, planing mills, a furniture factory, a tannery and various other establishments. There is also a large trade in cotton, and there are manufactories of cottonseed oil. The city has a Federal building, a county courthouse, Mobley Park and eight steel bridges across the rivers. It is the seat of Shorter College for Women, and it also has the Hearn Institute and Everett Springs Seminary. The place was chartered as a city in 1847. The commission form of government was adopted in 1915. Population, 1910, 12,099; in 1917, 15,607 (Federal estimate).

ROME, N. Y., in Oneida County, fifteen miles northwest of Utica, at the junction of the Erie, Barge and Black River canals, on the Mohawk River and on the New York, Ontario & Western and several lines of the New York Central railroad. It is in a dairying and farming region, producing considerable cheese, butter and hops. There are manfactures of steel rails, locomotives, brass and copper goods, electrical goods, soap, wire and textiles. The principal institutions include the state custodian asylum for the insane, a state institution for deaf-mutes, Saint Aloysius Academy, the Jervis Library, Y. M. C. A., Academy of the Holy Name, Rome Free Academy, three hospitals and a Federal building. Fort Stanwix was built on the site of the present city in 1758, and near here several battles of the Revolution were fought. Rome was incorporated as a town in 1796 and as a city in 1870. Population, 1910, 20,497; in 1917, 24,259 (Federal estimate).

ROMEO AND JULIET, *ro'meo and joo'li et*, one of Shakespeare's tragedies. It was first printed in 1597, and was followed by a corrected edition two years later. The direct source of the plot is credited to an English poem, the *Tragicall Historye of Romeus and Juliet*, written by Arthur Brooke in 1562, although the theme with many adaptations was extant *as far back as 1591*. The story, which has no historical foundation, concerns itself with the love of Romeo, of the house of Montague, and Juliet, of the house of Capulet. Between these two families a hatred was carried from generation to generation, and only over the dead bodies of the two lovers was the enmity cast aside and a reconciliation effected.

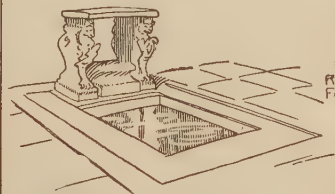
The rôle of the central figures has been a favorite of many actors and actresses of note. Bellini and Gounod each made the tragedy the subject of an opera, Galli-Curci scoring one of her great triumphs in the Gounod rendition. The subject also inspired the Berlioz dramatic symphony.

ROM'ULUS, the mythical founder and first king of Rome, was the son of Silvia, the daughter of Numitor, king of Alba. By the god Mars she became the mother of the twins Romulus and Remus. Their uncle, Amulius, who had driven Numitor from his throne, ordered the twins to be set afloat in a basket on the Tiber. The basket, according to the story, was stranded beneath a fig tree, at the foot of the Palatine Hill, and the boys were suckled by a she-wolf and fed by a woodpecker, until they were accidentally found by Faustus, the king's herdsman, who took them home and educated them.

ROME
Social Customs and Manners

BREAD SHOP

ROMAN MATRON
From a Statue in the Vatican



COURTYARD FOUNTAIN

SEAL RING

WATER BOTTLE

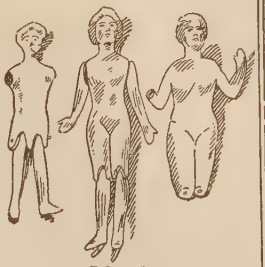
GLASSWARE

TOMBS ALONG THE APPIAN WAY

SOCIAL CUSTOMS

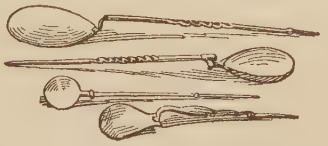
- HOMES
  - Architecture
  - Family Life
  - Social Life
  - Games
- SLAVERY
  - Origin
  - Influence
  - Number of Slaves
  - How Employed
- MARRIAGE
  - Preparation
  - Ceremony
- DRESS
  - Distinctions
  - The Toga
  - The Tunic
- DEATH
  - Funerals
  - Ceremonies

CENTURION IN STREET COSTUME

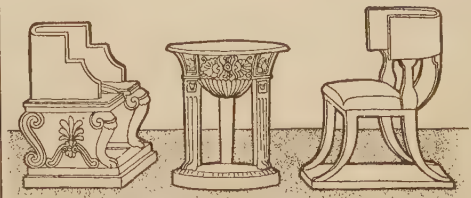


DOLLS

CISTERN



SPOONS



CHAIRS AND TABLE

H.M HAINES

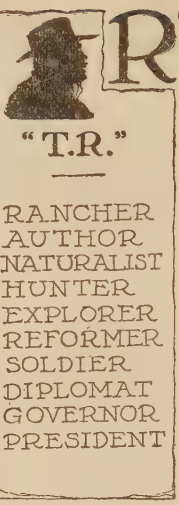
When they had grown up and become aware of their parentage, they organized a band of enterprising comrades, by whose help they deposed Amulius and reinstated Numitor on his throne. They next resolved to found a city, but as they disagreed as to the best site for it, they resolved to consult the omens. The decision was in favor of Romulus, who immediately began to raise the walls. Remus, who resented his defeat, leaped over the rude rampart in scorn, crying, "Thus will the enemy do," whereupon Romulus slew him, saying, "So perish all who in the future shall cross these walls."

Romulus soon attracted a considerable number of men to his new city, by making it a place of refuge for every outlaw or broken man.

Since surrounding tribes would not allow their daughters to marry the Romans, whom they looked upon as outlaws, the founders of the new city stole their wives from the Sabines. This led to a war, which was, however, ended at the entreaties of the Sabine wives, and from that time Romulus and the Sabine king ruled side by side. Romulus is said to have miraculously disappeared in a thunderstorm, carried off, according to the popular belief, by his father, Mars. The date of the founding of Rome was usually given as 753 B. C., and that of the death of Romulus, as 716 B. C. See ROME.

ROOK, a European bird of the crow family. In habit it is somewhat like the crow and the magpie, but differs from all other birds of this group in that it feeds entirely on grains and insects, has purplish plumage and sheds its face feathers on maturity. The most northern birds migrate in winter. Rooks nest in great colonies called rookeries. They are sometimes caught and tamed.

ROOKWOOD POTTERY, a ceramic ware manufactured in Rookwood, a suburb of Cincinnati, of American clays and by American methods. The experiment was begun in 1880 by Mrs. Bellamy Storer, and has been eminently successful, resulting in some of the most beautiful modern pottery. Most Rookwood pottery has a distinctive sea-green tone. It is made in original designs and is finished as cameo, dull-finished or richly-glazed ware. It is made almost entirely without machine operations, each piece passing through the hands of about twenty-five persons on its way from the clay-mixing process to the kiln.



ROOSEVELT, *ro'zeh velt*, THEODORE (1858-1919), the twenty-sixth President of the United States. His death, on January 6, 1919, brought to a close one of the most useful, interesting and active careers in American history. For nearly two decades Theodore Roosevelt had been a vital figure in the life of the nation; a storm center of political thought; a clear and definite voice on all subjects which affected his fellowmen. He was not only a statesman and political leader, but a reformer, traveler, writer, naturalist, bookman and athlete. Whatever interested humanity interested him, and he was no less vigorous in his utterances on such subjects as race suicide and "molycoddles" than on issues of international politics.

Like all men who speak and act with decision, he had bitter enemies as well as enthusiastic friends, but without doubt he will go down in history as the outstanding figure in the political and economic movement that transformed America in the opening period of the twentieth century. When the assassination of McKinley placed him in the President's chair he was already alive to the need of a new conscience in American affairs. It is to his credit that he had the courage to remain a reformer after he reached the White House, and that he stirred the nation to mark out new trails in the evolution of democracy. For this achievement, if for no other, he will be regarded as one of the greatest Presidents.

Early Life. Theodore Roosevelt was born on October 27, 1858, in the city of New York. The Roosevelt family had taken root on American soil two centuries before, in 1650, when a certain ambitious burgher of the Dutch family of Van Rosenvelt emigrated from Holland. The Roosevelts, as they came to be called, fared well financially and socially, and eventually were included among the wealthy and exclusive families of old New York. The father of the twenty-sixth President, also named Theodore, was a prosperous business man, who interested himself not only in finance, but in public affairs and philanthropy. He married Miss Martha Bul-

loch, of a well-known Southern family, and a descendant of the first governor of the state of Georgia.

It is an interesting fact that Theodore Roosevelt, the future President, who was noted for abounding vitality and extraordinary powers of endurance in his manhood, was a weakling as a boy. To overcome this handicap he courted health and strength by persistent exercise, and though his early schooling was somewhat irregular, he entered Harvard at the age of eighteen. After his graduation, in 1880, he studied law for a time at Columbia University, with the purpose, however, of broadening his mind rather than of preparing for the legal profession. Years before, the young man's father had taken an active interest in politics because he believed such participation was the duty of a good citizen. The son was to follow his example.

First Steps in Politics. In the fall of 1881, when he was just twenty-three years of age, Roosevelt won a seat in the lower house of the New York legislature. He was, to use his own words, a Republican by "education and inheritance," and he elected to work within that party as the best means of accomplishing certain ends. At that time the era of machine politics was at its height, and young Roosevelt threw himself heart and soul into a campaign against political bosses, spoilsmen and corruptionists. He was reëlected in 1882 and 1883, and his name became common in news dispatches and editorials from Boston to San Francisco. As chairman of the New York delegation to the Republican national convention of 1884, he energetically supported Senator George F. Edmunds, but when Blaine secured the nomination Roosevelt announced his intention of voting for him. It is an interesting detail that the Democratic nominee, Grover Cleveland, and the young Republican delegate had by this time become excellent friends through their work for reforms in New York, the one as governor of the state, and the other as a legislator.

A Ranchman. Roosevelt declined to run a fourth time for the legislature, and in 1884 he bought a ranch in North Dakota, seeking in Western life a respite from the strain of politics and domestic sorrows. In February of that year he lost his mother and his wife, the latter a daughter of George Cabot Lee of New York. As Alice Hathaway Lee she had married the young Harvard graduate in October, 1880, and had become the mother of a daughter, Alice, who later married, in the White House, the Hon. Nicholas Longworth, member of Congress from Ohio.

On his Elkhorn Ranch, Roosevelt, though introduced as a "four-eyed tenderfoot," won the friendship of the other ranchers by his honesty and readiness to "play the game." They soon learned, moreover, to respect his ability as a horseman and marksman. For two years he kept up the active management of his ranch, but he remained in touch with Eastern politics by spending his winters in New York, and in 1886, while at Elkhorn, he was nominated for mayor of his home city of New York by a coalition of Republicans and Independents.

Public Life Resumed. Roosevelt was defeated in a three-sided contest, in which he had as opponents a Democrat and the well-known single-taxer, Henry George. The following December he married in London, England, Miss Edith Kermit Carow. On his return to New York he quickly resumed his political activities, made campaign speeches for Harrison in 1888, and in 1889, after the latter's election, accepted a position as chairman of the Civil Service Commission. Always a vigorous foe of the spoils system, he impartially enforced the provisions of the civil service law, and through his influence the Commission made the service much broader in its application.

Roosevelt was retained on the commission by Cleveland, Harrison's successor, but in 1895 he resigned to become president of the board of police commissioners of New York City. Enforcement of the laws and the elimination of bribery were two policies with which his name became identified, and it is not overstating a fact to say that New York is a better city to-day because of his two-years' administration as its police commissioner. In 1896 he entered the campaign for McKinley. He was not a polished speaker, and in ability to sway an audience by the magic of oratory he could not approach McKinley's silver-tongued opponent, William J. Bryan, "the boy orator of the Platte." But he could win his audiences through his energy and his whole-hearted belief in his own arguments. There was vitality and honesty in his speeches, backed by a personality as distinctive as was Bryan's. He proved a very effective campaigner.

When McKinley began his first term as President the island of Cuba was in the turmoil of a revolution to which the American people were forced to give increasing attention. Roosevelt believed that the United States would have to intervene sooner or later, and he was given an opportunity to help the country prepare for such an emergency. In April, 1897, McKinley appointed him Assistant Secretary of the Navy. There was considerable "stirring of the dry bones" after he entered upon his new duties, as well as cutting of "red tape." He brought about a much-needed improvement in naval marksmanship, and was responsible for the selection of Dewey as commander of the Pacific fleet, besides bringing the whole department up to a higher standard of efficiency.

The Rough Riders. The declaration of war, in April, 1898, gave him another opportunity to serve his country. Resigning his department position, he organized the first United States Volunteer Cavalry, popularly and appropriately known as the "Rough Riders." The regiment was made up chiefly of cowboys from the Western plains, and it included many picturesque characters; in it, too, were Roosevelt admirers from the best families of the East. Assisting in its organization was Leonard Wood, its first colonel. Roosevelt himself was lieutenant-colonel, but when Wood rose to the rank of brigadier-general, his comrade in arms was promoted to be colonel, and it was he who led the Rough Riders in their great charge over San Juan Hill. In later years, when an ex-President, Roosevelt was universally spoken of as "Colonel."

Governor of New York. In September, 1898, Roosevelt was mustered out, and on January 1, 1899, he entered upon his duties as governor of New York. He had secured the nomination through the aid of the state "machine" leader, Senator Platt. The Republican party had lost prestige, and Platt knew that unless a man high in the esteem of the people were selected party defeat was sure to follow. At the same time Roosevelt bound himself in no way to follow the orders of the "bosses," and he gave the state an honest, efficient and progressive administration. If the politicians came his way, as he once said, he worked with them; if not, he worked without and in spite of them. As his term of office drew to a close Platt and other Republican leaders decided it was time to eliminate this trouble maker, whose investigation of the state canal system and fearless attitude toward the corporate interests were interfering with the smooth running of the "machine." Accordingly, in 1900 they forced on him the nomination for the most deadening office in the national government—the Vice-Presidency. The ticket, headed by McKinley, won by a comfortable margin over the opposition, led by Bryan.

President of the United States. Six months after his inauguration, President McKinley was struck down by an assassin's bullet, and on September 14, 1901, Theodore Roosevelt took the oath as chief executive. The "trouble maker," disliked by the "bosses," was the most powerful man in America and beloved by the people. He was then only forty-three years of age, the youngest President in American history, and he came to the high office superbly trained and in vigorous health. The new President announced that he would continue unchanged the policies of McKinley, and he asked all of the latter's Cabinet officials to remain. It was a strong Cabinet, containing such men as Elihu Root, who was Secretary of War, and John Hay, who was Secretary of State. In 1904 Roosevelt expressed his desire to be elected for a full term, and he was nominated by the Republican convention by acclamation. In the election he defeated the democratic nominee, Judge Alton B. Parker, by a popular majority of almost 2,000,000. The chief issue was the President's personality; he was accused by his opponents of recklessly violating his constitutional limitations, of invading the rights of Congress, and of being dangerously warlike. The election of 1904 showed what the people thought of these accusations.

THEODORE ROOSEVELT

Domestic Affairs. Roosevelt's seven and one-half years of office constitute a notable period of readjustment. When he became President the country was emerging from an era of industrial development in which "big business" had expanded without restraint. Corporate interests were wielding a pernicious influence on legislation, state and national, and the mass of the people, already awakened to this fact, were letting their

murmurs be heard. Indicative of the general unrest was the great anthracite coal strike of 1902, which was settled only after the President personally urged the employers and workers to arbitrate their dispute. McKinley's moderate program of trust legislation was not only carried out vigorously but expanded by his dynamic successor, who was keenly sensitive to the volume of discontent in the country as a whole. A great body of reform legislation was the tangible result. It included the Hepburn Railway Rate Act, the Federal meat-inspection and pure-food laws, and laws for the supervision of trusts, for a systematic method of tariff alteration, and for betterment of labor conditions. Suits were brought against various railways and other corporations, including the Standard Oil Company.

In this fight for more equitable conditions the reactionary elements bitterly criticized the President for "upsetting industrial stability." It is true that a moderately-serious financial panic occurred in 1907, but at that time the nation lacked the stabilizing influence of the present Federal Reserve system. The panic showed the need of currency reform, however, and in 1908 Congress passed the Aldrich-Vreeland Bill, providing for the issuance of emergency currency. Out of this came the establishment of a Monetary Commission in 1910, and the subsequent creation, in the first Wilson term, of the Federal Reserve system.

In line with Roosevelt's attitude toward the business interests was his great conservation policy. He gave definite shape to the movement for preserving the nation's natural resources by calling a conference of governors and other public men to discuss the subject, and by appointing a conservation commission to make an inventory of the national resources. During his administration over 234,000,000 acres of mineral and timber lands and water sites were placed under government control. Congress also passed a Reclamation Act providing for the irrigation of arid lands in the West. The scope of the Department of Agriculture was greatly extended, and in 1903 a new Department of Commerce and Labor (later divided into two departments) was created. Other constructive measures included the establishment of the Census Bureau on a permanent basis, the creation of a Bureau of Immigration, the enactment of a uniform naturalization law and the creation of a general staff for the army. As a consistent advocate of military preparedness the President worked for a larger navy, and to stimulate interest in this arm of the national defense he sent the battle fleet on a trip around the world.

Foreign Affairs. During the Roosevelt period the country was at peace and was respected throughout the world. Perhaps the most remarkable result of American diplomacy was the acquisition by the United States of a strip of land across the Isthmus of Panama. In 1903 the State Department negotiated a treaty with the state of Panama, which had seceded from Colombia, authorizing the United States to build a canal across the isthmus. The President was criticized for having had a part in the Panama rebellion, but the people as a whole believed that he did the only thing possible to prevent indefinite delay, and they upheld him. Certainly the construction of the great Panama Canal will always be linked with his name.

The principle of international arbitration was vigorously applied by the President. He persuaded Great Britain and Germany to submit certain claims against Venezuela to arbitration, and the Alaska boundary dispute between the United States and Great Britain was settled in like manner. In 1906 an insurrection in Cuba caused the United States to intervene in the affairs of the island republic, but true to its promises, the American government withdrew its power when order was restored. In the Philippines civil government was successfully put into operation, and the islands were brought closer into communication with America by the laying of a cable across the Pacific. Undoubtedly the greatest personal triumph of Roosevelt in the field of diplomacy was his intervention in the war between Russia and Japan. He intervened by inviting the Russian and Japanese governments to send peace commissioners to America, and as a result a treaty of peace was signed at Portsmouth, N. H., in September, 1905. The following year the President was awarded the Nobel peace prize, for services in behalf of international harmony.

Other Events. One state—Oklahoma—entered the Union during this administration, and there occurred one great disaster, the San Francisco earthquake and fire. A great international exposition was held at Saint Louis in 1904, in commemoration of the Louisiana Purchase; a year later the Lewis and Clark Exposition was held at Portland,

Ore., and in 1907 the Jamestown Tercentennial was celebrated at Hampton Roads, Va. In 1908 the nation mourned the passing of Ex-President Cleveland.

As Roosevelt's second term drew to a close there was a strong movement for his renomination, but he declined in favor of his Secretary of War, William H. Taft, who had won a notable reputation as civil governor in the Philippines. In the ensuing election the Republican ticket won by an electoral vote of 321 to 162. The Democratic candidate, William J. Bryan, was thus defeated for the third time.

A Great Ex-President. The last decade of Roosevelt's life was crowded with incident. He retired from the Presidency in the prime of physical and mental vigor, and to the day of his death he lived in a world of action. As soon as he was free from the claims of office he departed on a hunting trip to Africa with his son Kermit. Several valuable trophies of this expedition are now a part of the zoölogical collection in the Smithsonian Institution, Washington. On his journey home, in 1910, Roosevelt visited several European countries, lecturing meantime, at the universities of Berlin, Christiania and Oxford, and at the Sorbonne, Paris. Everywhere he was welcomed as the greatest American citizen, much to the gratification of the American people, who gave him an unprecedented welcome when he landed in America.

Back in Politics. When Roosevelt returned home he found a marked cleavage in the ranks of the Republicans. His personal choice for the Presidency, Mr. Taft, was definitely aligned with the regulars, or conservatives, and his own followers, the progressives, or insurgents, were in revolt. In response to a great popular demand that he resume leadership of the party, Roosevelt announced his candidacy for the Presidential nomination early in 1912, and in the spring primaries he carried state after state. Nevertheless, in the national convention which met at Chicago in the summer of 1912 the conservatives had control, and Taft secured the nomination. Amid scenes of great excitement as the roll call ended, the Roosevelt delegates marched out of the assembly hall and held a protest meeting of their own in another auditorium. This revolt was more than a party split; it resulted in the organization of a new Progressive party, with a platform calling for social reform, the initiative and referendum, the recall of judicial decisions, woman suffrage and other radical measures.

A Progressive convention was held later in the summer, at which Roosevelt was nominated for President, and Hiram Johnson, governor of California, was named for Vice-President. In a campaign unmatched for bitterness Roosevelt toured the country, speaking with equal vigor against his Republican opponent and his Democratic rival, Woodrow Wilson. Late in the campaign, as he was about to enter a carriage which was to take him to an assembly hall in Milwaukee, he was shot by a deranged man. Before he would submit to medical attention, however, he proceeded to the hall and delivered his address. This incident ended his active part in the campaign, but in the election he carried more states and secured more votes than the Republican nominee. The Democrats stayed in their own camp, and, profiting by the divided Republican vote, carried forty states.

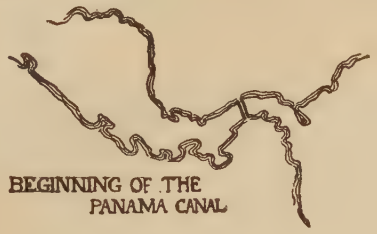
The Progressive party was permanently organized, but it did not hold the rank and file of Republicans, and in course of time the organization disappeared. Roosevelt himself returned to the Republican fold in the campaign of 1916, and actively supported Charles E. Hughes. He believed that the great revolt of 1912 had put new life into the historic party and had saved it from becoming hopelessly reactionary. Therefore, he never regretted the step he took, though he made lasting enemies thereby.

South American Trip. An exploring expedition to South America followed the dramatic events of 1912. In 1913 Roosevelt delivered addresses before several South American universities and learned societies, and between February and April, 1914, he led an exploring party for 600 miles along an unknown tributary of the Madeira River. Subsequently the Brazilian government named this stream the Reo Teodoro in his honor. While in the South American jungles he contracted a fever which nearly caused his death, and permanently undermined his health.

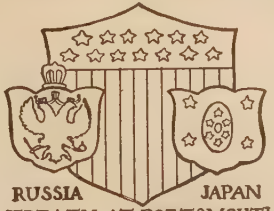
Roosevelt and the World War. Roosevelt was strongly opposed to the pacifist tendencies of President Wilson, and criticized him both for his cautious attitude in regard to Mexico and for his method of dealing with the complications arising from the World War. When the war began, in 1914, he believed, with the majority of Americans, that the

ROOSEVELT'S ADMINISTRATION

1901 — 1909



BEGINNING OF THE PANAMA CANAL



RUSSIA JAPAN TREATY AT PORTSMOUTH

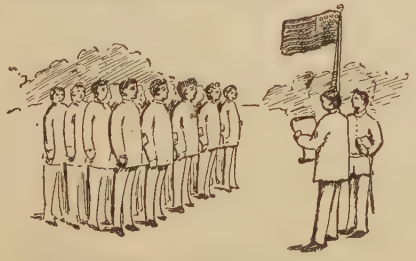
LEWIS AND CLARK EXPOSITION

CONSERVATION CONGRESS

LOUISIANA PURCHASE EXPOSITION

ANTHRACITE COAL STRIKE

JAMESTOWN EXPOSITION



GOVERNMENT ESTABLISHED IN THE PHILIPPINES

PACIFIC CABLE LAID

DEATH OF GROVER CLEVELAND

SAN FRANCISCO EARTHQUAKE, 1906

The Administration of Theodore Roosevelt, 1901-1909

I. The President
- (1) Birth
- (2) Education
- (3) Public Life
- (4) Military career
- (5) As an author
- (6) Character

II. Governmental Affairs
- (1) Important laws
  - (a) Elkins Anti-trust Act, 1903
  - (b) Railway Rate Regulation
  - (c) Pure food and meat inspection laws
- (2) Administrative
  - (a) Reclamation and Irrigation Service established, 1901
  - (b) Census Office made a permanent bureau
  - (c) Department of Commerce and Labor established
  - (d) Reorganization of the army
  - (e) Conservation Congress
- (3) Foreign
  - (a) Relations with Venezuela
  - (b) Santo Domingo
  - (c) Cuba
    - (1) Reciprocity treaty
    - (2) U. S. provisional government
  - (d) The Isthmian Canal question
    - (1) Hay-Pauncefote treaty
    - (2) Attempts to negotiate with Colombia
    - (3) Revolution and establishment of republic of Panama
    - (4) U. S. treaty with Panama
    - (5) Construction of the canal by the United States
  - (e) Treaty of Portsmouth, 1905
  - (f) Cruise of a United States fleet around the world

III. Local and Internal Affairs
- (1) Expositions
  - (a) Louisiana Purchase
  - (b) Lewis and Clark
  - (c) Jamestown
- (2) San Francisco earthquake and fire
- (3) Pacific Cable laid
- (4) Anthracite coal strike
- (5) Northern Securities Case
  - (a) Northern Securities Company controlled both the Great Northern and the Northern Pacific railroads
  - (b) Court held that competing railroads could not be so controlled
- (6) New York insurance investigation
  - (a) Corruption and illegalities
  - (b) Charles Evans Hughes
- (7) Panic of 1907
  - (a) Financial crisis
  - (b) Causes
- (8) Admission of Oklahoma
- (9) Death of Grover Cleveland
- (10) Elections of 1904 and 1908
  - (a) Issues
  - (b) Candidates

Questions on Roosevelt

Give a brief account of Theodore Roosevelt's career before he became President.

What reform measures were passed in his administration?

What did the pure food laws accomplish?

What is the Reclamation Service?

When was the Department of Commerce and Labor established?

How was it later divided?

What was the Conservation Congress?

What did the Hay-Pauncefote Treaty accomplish?

When was the republic of Panama established?

What can you say about the Treaty of Portsmouth?

What great expositions were held in the United States during Roosevelt's administration?

What are the Nobel Prizes?

Who is Charles Evans Hughes?

When and how did he become prominent?

United States should remain neutral. Later, as Germany's disregard for the rights of humanity, as typified by the sinking of the *Lusitania,* became more flagrant, he was openly anti-German, and urged that America intervene. When the decisive step was taken he longed to be in the thick of the fight, and offered to lead a volunteer division in France. This honor was denied him, but he gave his four sons to the cause, all of whom won honor in active fighting. His youngest son, Quentin, lost his life as an aviator, and lies buried in France.

Throughout the period of American participation Roosevelt unsparingly criticized anyone, from the President down, who he thought was not energetic enough in carrying on the struggle. Possibly his criticisms were not always just, but a man of his temperament could not do otherwise.

This exponent of the "strenuous life," whose career was a series of hard-fought battles, died quietly in his sleep, at Sagamore Hill, his home at Oyster Bay, on the morning of January 6, 1919. He had lived to see the triumph of the cause that meant so much to him, but, in the words of a contemporary observer, "If his biographers read his end aright, they will see him as a man who died when and how he did chiefly because of an overwhelming but frustrated desire to join his fellow countrymen in the great fight."

The Roosevelt Writings. The marvelous versatility of Theodore Roosevelt is shown in the great body of writings which he left. Both for style and for subject matter these writings are of permanent value and interest. His first book, *History of the Naval War of 1812,* he published in 1882; he was still writing in the last year of his life. The Roosevelt publications fill twenty-five volumes, and include history, biography, narratives of the writer's travels, collections of lectures and essays on varied subjects, an autobiography and nature sketches. Representative titles include *Winning of the West, Life of Gouverneur Morris, The Strenuous Life, True Americanism, The New Nationalism, African Game Trails* and *Fear God and Take Your Own Part.*

Related Articles. Various events and topics referred to in this article are given fuller treatment under the following headings:

Cleveland, Grover
Colombia
Conservation
Cuba (history)
McKinley, William
Nobel Prizes
Panama Canal
Political parties in the United States
Pure Food Laws
Rough Riders
Spanish-American War
Taft, William H.
Trusts

ROOSEVELT DAM. See IRRIGATION.

ROOT, in mathematics, one of the equal factors of a number or quantity, or a number or quantity which when multiplied by itself one or more times will produce a given number or quantity. To illustrate, since $4\times4=16$, 4 is a root of 16; again, since $5\times5\times5=125$, 5 is a root of 125. Square root is one of two equal factors of a quantity, and cube root is one of three equal factors. See EVOLUTION; SQUARE ROOT; CUBE ROOT.

ROOT, ELIHU (1845-), an American statesman, diplomat and corporation counsel, prominently identified with the affairs of his country for nearly two score years. He was born at Clinton, N. Y., and was educated in that town at Hamilton College. After his graduation in law at New York University he was admitted to the bar, and in 1867 began the practice of law in New York City. Root's first public office was that of United States district attorney for the New York southern district. This office he held from 1883 to 1885. He was later prominent in Republican politics, and in 1899 succeeded Russell A. Alger as Secretary of War in McKinley's Cabinet. When Roosevelt became President he retained Root as head of the War Department, and the latter served with distinction until 1904, when he retired to practice law. In 1905 he succeeded John Hay as Secretary of State, and in 1909 he entered the United States Senate. While in the Senate he acted as counsel for the United States in the arbitration of the North Atlantic fisheries dispute (1910), and in the same year was appointed a member of the Permanent Court of Arbitration at The Hague. For his activities in behalf of international peace he was awarded the Nobel prize for peace in 1912.

Root retired from the Senate in 1915. In 1917 President Wilson appointed him chairman of the American commission to Russia, which conferred with the leaders of the new democratic government on economic and financial matters. He also rendered valuable service throughout the war period by his able discussion of the issues at stake. After the war Root was retained as counsel by the brewing interests of the United States, in their struggle against prohibition.

ROOT, GEORGE FREDERICK (1820-1895), an American composer, born at Sheffield, Mass. He taught music in Boston and New York, studied a year in Paris and then returned

to America. During the Civil War period he made a fortune by publishing patriotic songs, most of them his own compositions. These include *Tramp, Tramp, Tramp the Boys are Marching; The Battle Cry of Freedom; Just Before the Battle, Mother* and *There's Music in the Air.* Among his more ambitious works are a *Te Deum, Belshazzar's Feast* and *The Pilgrim Fathers.*

ROOTS. The root is one of the three essential parts of a plant, the others being the stem and the leaves. Ordinarily roots grow downward into the soil, and when no descriptive term is given with the word means that part of the plant which grows in the ground and through which the plant obtains its nourishment from the soil. The root also holds the plant in position. Roots that spring directly from the embryo are called *primary;* those that spring from primary roots are called *secondary.* All the roots of a plant form its *root system.* The tiny rootlets, or *root hairs,* are the organs through which the plant draws water and nourishment from the soil.

In forms roots are *fibrous* or *fleshy.* The roots of corn, wheat and grass are good illustrations of fibrous roots. Turnips, beets and sweet potatoes are good illustrations of plants with fleshy roots. *Aerial* roots are those growing in the air, like roots developed by some orchids. Some plants, like the water hyacinth, have roots that live in the water. A *taproot* is the main root of a fibrous system, like the largest root of a tree. *Adventitious* roots spring from the stem and serve to brace the plant. Those in corn are a good example. See BOTANY, PLANT.

ROPE, a cord one or more inches in diameter. The distinction between rope and cordage is in size only, the term *cordage* being applied to sizes less than one inch in diameter. Hemp, jute, coir and cotton are the vegetable fibers most generally used for making ropes. Manila hemp, obtained from the Philippine Islands, is the most desirable, because of its strength. While cotton makes the strongest rope, it is too expensive for general use.

The process of manufacture is practically the same for all material, and most of the work is done by machinery. The hemp is received at the factory in bales. The fiber is first straightened and sprinkled with oil, then is passed through a machine called a *spreader.* From the spreader the hemp passes through a number of *breakers,* which straighten the fibers and arrange them into a ribbon called the *sliver.* The sliver passes through another series of breakers, which prepare the fiber for spinning. As the fiber is spun, the yarn is wound on large bobbins. The yarn is then twisted into strands, and the strands into rope. Three strands are used in making a small rope, and a larger number for larger sizes.

The strength of a rope depends upon its size and the material of which it is made. A hemp cord 1.53 inches in circumference will sustain a weight of 1,670 pounds; one 2.7 inches in diameter will withstand a strain of over 33,800 pounds.

Wire Rope. Wire ropes are made of wires twisted together, in the same manner as hemp is manipulated in making hemp ropes. Steel, iron or copper wire may be used, but steel is most generally employed, because of its greater strength and durability. Wire ropes are used for cables, in derricks and other hoisting machines, for rigging ships and for numerous other purposes.

ROR'QUAL, the name of the largest species of whales. The rorqual is distinguished from the *common,* or *right,* whale by having a dorsal fin and deep wrinkles on the throat. The head is comparatively small and flat, the body long and slender; the tail narrows before expanding into flukes. Rorquals are not as valuable as the right whale. See WHALE.

RO'SA, MONTE, mountain or group of mountains in the Pennine Alps, lying on the frontier of Switzerland, and second in altitude only to Mont Blanc, from which it is about fifty miles distant. It consists of eight summits, the highest being Dufourspitze, 15,217 feet. The mountain is covered with snow, and on one side is the great Görner glacier. In 1904 an observatory was established on Monte Rosa at an altitude of 15,000 feet.

ROSACEAE, *ro za'se ee,* or the Rose family, one of the most important orders of flowering plants, containing about seventy-five genera and 1,200 species of herbs, shrubs, and trees. Most of these species live in cooler parts of the northern hemisphere, and many are of great value. The apple, pear, plum, cherry, peach, almond, nectarine, apricot, strawberry and the raspberry are all fruits of the rose family, and they vary greatly in structure. The leaves differ as much as the fruit, although the flowers have a characteristic appearance easily recognized

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SOME MEMBERS OF THE ROSE FAMILY

1—Wild Rose. 2—Plum. 3—Peach. 4—Blackberry. 5—Raspberry. 6—Strawberry. 7 Cherry. 8—Cultivated Rose. 9—Apple. 10—Pear.

from their resemblance to the apple or strawberry blossom. Many of these fruits and flowers are separately described in these volumes under the names of specific species. See ROSE.

ROS'AMOND, commonly called FAIR ROSAMOND, the mistress of Henry II of England. She died about 1176, soon after her connection with the king was openly avowed, and was buried in the church of Godstow Nunnery, from which Hugh of Lincoln caused her body to be removed in 1191. Almost all the stories related of Rosamond are legendary. The fable of the dagger and poison, with which the jealous Queen Eleanor is said to have sought out her rival, originated long after Rosamond had died.

ROSARIO, *ro sah're o*, ARGENTINA, the second largest city in the republic, surpassed only by Buenos Aires. It is on the west bank of the Parana River, 170 miles northwest of Buenos Aires, in the southern part of the province of Santa Fé. It has rail communication with the interior provinces and with the Argentine capital, and is a busy river port. The city is well built, with wide streets, numerous parks and attractive homes. Modern electric street cars have been operated in Rosario since 1908. The city has prosperous flour mills, breweries and other manufactories, and the largest sugar refinery in the republic. There is a vast import and export trade, which is facilitated by modern docks, wharves, warehouses and other harbor accommodations. Rosario has, among other structures, handsome bank buildings, a courthouse covering an entire city block, fine public school buildings and a cathedral. Population, 1918, estimated, 235,000.

ROSARY, *ro'za ri*, in the Roman Catholic Church, a series of devotions consisting of a specified number of paternosters, aves and glorias arranged in groups. It begins with a paternoster (the Lord's prayer). This is followed by ten aves (salutations to the Virgin), and after these is a gloria (doxology). The ordinary rosary consists of fifteen of such groups. A string of beads, also called a rosary, is used to count the prayers. It ends in a pendant, to which is attached three beads and a crucifix. The beads, large and small, represent respectively paternosters and aves, and the crucifix stands for the Apostles' Creed. In reciting the aves the devotee meditates upon the various mysteries of the life of Christ—the joyful mysteries (annunciation and nativity), the sorrowful mysteries (the passion), and the glorious mysteries (the resurrection and ascension).

The Greek, Armenian and other Eastern communities also use in their devotions a chaplet called a rosary.

ROSE, a genus of beautiful and fragrant flowers which has given its name to one of the largest botanical families, the *Rosaceae* (which see). Innumerable cultivated varieties of the rose have been developed, but in nature the rose plant is a thorny shrub with pinnate leaves. The shrubs vary in height from one to six or more feet, excepting those varieties that take the form of vines. The flower has five petals surrounding numerous stamens. The seeds are enclosed in a spherical receptacle, which when ripe forms a dry berry. The rose in its original form is seldom found except in an occasional old-fashioned garden and on the prairie. Roses cultivated for their flowers have been developed from the wild species by changing the stamens into petals.

THE ROSE

Among the most common of the garden roses are the *pink cabbage*, or *Provence, rose*, a very old variety of Eastern origin; the *Cherokee rose*, a native of China, with single, large, pure white flowers; the old-fashioned sweet-scented *cinnamon rose*, from Europe; the *pink damask roses*, from Damascus; the *climbing evergreen rose*, of Southern Europe, with its shining leaves and brillant flowers; the *Scotch roses*, which are of dwarf stature, but very hardy, producing early in the summer an abundant crop of red, white or yellow flowers; the common *white rose*, from the Caucasus; the common *yellow rose*, from Asia Minor, often called the Austrian brier, or yellow eglantine; the *Bengal*, or *monthly, rose*, a hardy, perpetual bloomer, with a profusion of brilliant flowers, and the *Queen of the Prairie* and *Baltimore Belle*, cultivated varieties of the wild prairie rose. In the wonderful climate of Cannes, France, the

Riviera, Italy, and Southern California, roses grow in a beauty and profusion that can scarcely be conceived by one who has never visited these places. There are bowers of roses, hedges of roses, and cottages and even public buildings are almost hidden by them. Among the principal greenhouse varieties are the *American Beauty,* dark red; the *bride,* white; the *bridesmaid,* pink; the *pearl of the garden,* yellow; the *liberty, crimson* and the *Ulrich Brunner,* cherry red.

In the language of flowers, the red or white rose stands for love and the yellow rose for jealousy. The rose is the national flower of England and Persia, and the state flower of New York and Iowa. Portland, Ore., is known as the "Rose City", and a carnival of roses is held there on some day in June, every year. The tournament of roses held every New Year's Day in Pasadena, California, has become one of the most gorgeous flower spectacles in the world.

Rose growing in hothouses has become a very important industry in the United States and has been brought to a remarkable degree of perfection. Every good greenhouse has its rose house, where the plants are given the tenderest care. They require a stiff pasture loam, careful fertilization, good drainage and plenty of ventilation. Different varieties, however, require such different treatment that the florist must know thoroughly the nature of each individual plant. For the sake of convenience, the florists and botanists divide all cultivated roses into two classes—summer, or once-blooming, roses, and autumnal, or ever-blooming, roses.

ROSEBERY, *roze'ber ry,* ARCHIBALD PHILIP PRIMROSE, Earl of (1847–), an English statesman, educated at Eton and Oxford. In 1868 he succeeded to the earldom and entered the House of Lords. He was under-secretary at the home office from 1881 to 1883, lord privy seal and first commissioner of works in 1885, and in the next year he held the secretaryship of foreign affairs, till the fall of the Gladstone government. In 1889 he became a member of the London County Council and was appointed chairman of that body. In 1892 he became Secretary of State for Foreign Affairs under Gladstone, and in 1894 he succeeded Gladstone as Premier, holding office, however, little more than a year. Early in his career he won the favor of the masses by advocating measures for bettering the conditions of the working people. He is the author of *William Pitt, Appreciations and Addresses, Sir Robert Peel, Napoleon, Cromwell* and *Chatham.*

ROSECRANS, *ro'ze krans,* WILLIAM STARKE (1819–1898), an American general, born at Kingston, Ohio. He graduated at West Point in 1842 and was employed there for a time as assistant professor. In 1854 he resigned from the army and became a civil engineer, but when the Civil War broke out he volunteered as aide to General McClellan. When McClellan was appointed commander of the Army of the Potomac Rosecrans was given the rank of brigadier-general and placed in command of the forces in Western Virginia. In 1862, after the evacuation of Corinth by the Confederates, he was given command of the army in Mississippi and successfully defended the city against Price and Van Dorn. Later he commanded the Department of the Cumberland. He defeated the Confederates under Bragg in the Battle of Murfreesboro, but at Chickamauga was defeated by Bragg, with great loss. He was succeeded by General Thomas and later was relieved of his commission. At the close of the war he resigned from the army.

ROSECRANS

ROSEMARY, *roze'ma ry,* an evergreen aromatic shrub of the mint family, a native of Southern Europe. It grows from four to eight feet high, has dark green leaves, with a white under surface, and pale blue flowers in graceful sprays. Rosemary yields, by distillation, an oil used in making perfumes and aromatic waters. The rosemary is an emblem of remembrance and fidelity. *American rosemary,* found on the Atlantic coasts, belongs to the leadwort family.

ROSE OF JERICHO. See JERICHO ROSE.

ROSES, WARS OF THE, the name given to the struggle for the throne of England between the House of Lancaster and the House of York. The emblem of the House of Lancaster was a red rose and that of the House of York a white rose, hence the name of the conflict. The war began in 1455 with the Battle of Saint Albans, and lasted, with short

intervals of peace, for thirty years, ending with the Battle of Bosworth in 1485.

At the beginning of the struggle, Henry VI, a Lancastrian, was on the throne. His chief opponent was Richard, Duke of York. During the struggle Henry was deposed, then reinstated and deposed a second time, while the head of the Yorkist faction, Edward IV, managed to hold the throne, with the exception of a short interval, from 1461 to 1483. After the accession of Richard III, a rising occurred under the Duke of Richmond, who drove Richard from the throne and himself was crowned king as Henry VII. He married Elizabeth, daughter of Edward IV, and thus united the two factions.

ROSET'TA STONE, a tablet of black basalt found near Rosetta, Egypt, by a French engineer in 1799, and now in the British Museum. The tablet contains identical inscriptions in ancient Egyptian hieroglyphics, in Demotic, a modified form of the Egyptian writing, and in Greek. By comparing the Egyptian characters with the Greek a clue to these ancient writings was found, so the Rosetta stone is considered to be the key to the ancient Egyptian hieroglyphics. The inscription on the stone was in honor of Ptolemy V, Epiphanes, and was made in 195 B. C. See HIEROGLYPHICS.

ROSE WINDOW, a circular window, divided into compartments by mullions and tracery radiating from a center, also called *Catharine wheel* and *marigold window*, according to the modifications of the design. It forms a fine feature in the church architecture of the thirteenth and fourteenth centuries, and it is mostly employed in the triangular spaces of gables. In France it is much used, and notwithstanding difficulties of construction, it has attained great size. Fine examples are to be seen in the cathedrals of Paris, Rheims, and Amiens. During the World War a number of these windows, which were exquisite works of art, were destroyed.

ROSE'WOOD, the name of several varieties of wood used in making musical instruments and ornamental furniture. The rosewoods are usually of a deep rose color, marked with dark lines, which under polishing becomes almost black. The woods are used in veneering furniture and in making the cases of pianos and other musical instruments. The best wood is obtained from Brazil, the East Indies and Africa. The odor of rosewood is noticeably like that of roses, and from this fact the name is derived.

ROSIN, *roz'in*, the resin of cone-bearing trees, especially pitch pine, from which it may exude in small quantities. The resin of commerce is prepared by distilling turpentine. The resin remains in the tank, and the turpentine passes over. Rosin is brittle and of yellowish-brown color, and it has a characteristic odor, but is practically tasteless. It is used in the manufacture of sealing wax, varnish, cement and soap; for soldering, and in the manufacture of various kinds of plaster and cement. See RESINS; TURPENTINE.

ROSS, ALEXANDER (1783–1856), a Canadian pioneer and author. He went to Canada from Scotland in 1805, joined Astor's expedition to Oregon in 1810 and was afterward a fur trader in the Hudson Bay Company's service. He is the author of *Adventures of the First Settlers on the Oregon*, *The Fur Hunters of the Far West* and *The Red River Settlement*.

ROSS, BETSY (1752–1836), a Philadelphia seamstress who became famous in American history as the maker of the first United States flag. In June, 1777, a committee from Congress, headed by General Washington, came to her house at 239 Arch Street to commission her to make a flag according to a design adopted by Congress on June 14. The flag Mrs. Ross made had thirteen stars arranged in a circle on a blue ground, and thirteen stripes, alternate red and white. It was so much admired that the government made a contract with her to make all the flags, and it engaged the daughter of Mrs. Ross to continue the work long after her mother's death. The house on Arch Street is preserved as a memorial of the famous seamstress.

ROSS, JAMES CLARK, Sir (1800–1862), an Arctic and Antarctic explorer, born in London. He entered the British navy at the age of twelve, accompanied his uncle, Sir John Ross, on his two voyages in search of a northwest passage and in the interval between them accompanied Captain Parry in four Arctic voyages. He was promoted to the rank of post captain in 1834, particularly for the determination of the position of the north magnetic pole. He commanded the expedition of the *Erebus* and *Terror* to Antarctic regions (1839–1843), and discovered Victoria Land and several islands. He attained latitude 78° 10′ S., a record which was not broken until 1900. His published narra-

tive of this voyage was a valuable contribution to geographic and scientific knowledge. He was knighted for his services. In 1848 he made an unsuccessful expedition to Baffin's Bay, in search of Sir John Franklin. In 1856 he was made rear-admiral. See NORTH POLAR EXPLORATION; SOUTH POLAR EXPLORATION.

ROSSET'TI, CHRISTINA GEORGINA (1830–1894), an English poet, the sister of Dante Gabriel Rossetti, was born in London, and educated at home. Her main interests were religion and poetry, and she lived a quiet, retiring life, devoting her time to literary pursuits. Many of her best poems are distinctly religious in tone, but they are also noteworthy for their revelation of the beauty in the world. Critics agree in ranking her next to Elizabeth Barrett Browning among the English women writers of the nineteenth century. *Goblin Market and Other Poems, The Prince's Progress and Other Poems* and *A Pageant and Other Poems* contain most of her works. *Up Hill* is probably her most popular poem.

ROSSETTI, GABRIEL CHARLES DANTE (1828–1882), better known as Dante Gabriel, an English painter and poet, born in London, the son of an Italian patriot, who was a refugee in England and a professor in Oxford. He early showed a genius for art, studied in the Royal Academy and later became a pupil of Ford Madox Brown. His intensity of feeling in both painting and poetry gathered around him a small group of painters, among whom were Holman Hunt, Thomas Woolner, Millais and others, who founded the so-called *Pre-Raphaelite Brotherhood,* with Rossetti as their leader. This group advocated a return to the purity and idealism of the old masters before Raphael, and their effort was to ennoble art and to give their work sincerity. Other painters who have continued the practice of these principles are called Pre-Raphaelites (which see). In 1849 Rossetti exhibited his painting of the *Girlhood of Mary Virgin;* but his later works, numerous as they were, were rarely seen by the public until the posthumous exhibition of a collection of his paintings in 1883 at the Royal Academy. His principal paintings are *Dante's Dream, Salutation of Beatrice, Dying Beatrice, La Pia, Proserpine, Sibylla Palmifera, Monna Vanna,* and *Venus Verticordia.* In most of his pictures he has represented the face of his wife, to whom he was very devoted. His subjects are generally religious or mystical and reveal wonderful imaginative sentiment and wealth of color.

As a poet Rossetti takes high rank. At the age of twenty he wrote his most famous poem, *The Blessed Damosel,* a rare combination of simplicity and spirituality. It is considered to represent the aims and ideals of the Pre-Raphaelite School, both in literature and art. *My Sister's Sleep,* another of his early poems, is also of rare merit. Besides these, *The House of Life, The King's Tragedy and Other Ballads,* and *Dante at Verona* include most of his poems. In 1861 he published *The Early Italian Poets,* a series of translations afterwards reissued under the title of *Dante and His Circle.*

ROSSINI, *rohs se'ne,* GIOACHINO ANTONIO (1792–1868), an Italian composer born at Pesaro. He wrote many comic and serious operas, all of those by which he is most widely known appearing before he was thirty years old. The best known of his operas are *The Barber of Seville, Othello, William Tell, Semiramide, Ermione, Moses in Egypt* and *Lady of the Lake.* Perhaps his most famous work is *Stabat Mater.* Before he had reached middle life, Rossini had become one of the best-known composers of his day, but his indolence and vanity caused his popularity to wane rapidly. He resided at different times in London, Paris, Naples, Florence and Bologna, and died in comparative obscurity.

ROSTAND, *rohs tahN',* EDMOND (1869–1918), a French dramatist and poet, and author of a celebrated play *Cyrano de Bergerac,* was born at Marseilles. He was the son of a great journalist, and his early writings showed his skill and ability. His first play, a comedy, was produced in paris in 1894, and was very successful. *Cyrano* was translated into English and several other languages, and was produced in the leading cities of Europe and America. His next famous play was *Chantecler,* a fantasy of bird and animal life, which was eminently successful. Rostand was elected a member of the French Academy in 1902.

ROSWELL, *rahz'wel,* N. M., the county seat of Chaves County, 230 miles northeast of El Paso, on the Pecos, Berrendo, Spring and Hondo rivers, and on the Atchison, Topeka & Santa Fé Railroad, built to the city in 1900. There is a Carnegie Library, a courthouse, a Federal building, a hospital and

the New Mexico Military Institute. The surrounding country is a farming and stock-raising section. Roswell is governed on the city manager plan. Population, 1910, 6,172; in 1917, about 10,000.

ROT, a disease afflicting sheep and occasionally other domestic animals. It is caused by the presence in the gall bladder of a parasite known as the liver fluke, which is developed from germs swallowed by the animals with their food. The average length of the fluke is about one inch. Several dozen of these parasites may sometimes be found in the liver of a single sheep. Damp atmosphere or damp soil or fodder promotes the disease, which in almost all cases proves fatal.

ROTATION OF CROPS, the practice in agriculture and horticulture of growing different crops on the same piece of land in succeeding years. The plant foods found in the soil—nitrogen, phosphorus and potash—occur in varying proportions in different soils. Some plants require more of one of these foods than others, and if the same plant is raised on the land year after year, at least one of these foods will become exhausted to such an extent that the plant will not receive sufficient nourishment to produce a good crop. Moreover, if the same crop is grown continually on the same ground, diseases and insect pests increase from season to season. Rust and cinch bugs destroy wheat, but if a crop of wheat is followed by one of corn or clover, these pests disappear because there is nothing for them to feed upon. Such crops as wheat, oats and barley, that do not admit of tillage, allow weeds to multiply rapidly. If such a crop is followed by corn or some other crop that admits of tillage for several weeks, most of the weeds are killed.

From the above illustration it is evident that rotation of crops is necessary because—

1. It is one of the best means of maintaining the fertility of the soil.
2. It is a check upon plant diseases and insect pests.
3. It enables the farmer to check the growth of weeds.

Systems of Rotation. Many systems of crop rotation have been advocated, and all contain certain underlying principles that the farmer should understand. However, no system can be applied successfully to any large area, because in planning crop rotation the farmer must consider chiefly local conditions, such as the nature and fertility of his soil, the adaptation of climatic conditions to the crops under consideration, the probability of marketing his crop at a profit, and the economy of labor connected with raising the various crops. All systems include grain crops, grass crops and cultivated crops, with at least one application of manure during the series.

The following five-years' rotation yields good results in many localities: First year, corn, following an application of eight tons of manure per acre; second year, wheat; third and fourth years, grass (timothy and clover); fifth year, oats.

School Work in Rotation of Crops. The subject of agriculture in the public schools is one to which more and more importance is attached every year. In some counties each teacher is furnished with a tentative course in agriculture for all grades, and while it is not compulsory usually to follow such an outline, it is always strongly recommended.

If in any school there is sufficient interest in the matter and enough time can be given to it, a form of work in agriculture after the following outline may well be adopted.

A field seventy-two feet by one hundred eight feet, not counting spaces for walks, should be provided. A diagram of such a plot offered by County Superintendent George W. Brown of Paris, Illinois, is used by permission. It is a modification of a plan suggested by officials in the Western Illinois State Normal School.

10	11	12	13	14	15
20	21	22	23	24	25
30	31	32	33	34	35
40	41	42	43	44	45

DIAGRAM OF EXPERIMENTAL FIELD

Every boundary line should be a grass or gravel walk three feet wide. Every square should be eighteen by eighteen feet. Before harvesting a crop on any square each plot or square should be cut down to the dimensions of the square rod for purposes of easy computation and record. Having determined the yield in one square rod, mul-

tiply by 160 to determine the yield per acre. On such a plot it is possible to study with excellent results rotation of crops.

Rotations should be conducted as follows:

Plots 10, 11, 12, 13, 14, 15—Continuous corn crops.

Plots 20, 21, 22, 23, 24, 25—Corn and oats rotation.

Plots 30, 31, 32, 33, 34, 35—Corn, oats and clover rotation.

Plots 40, 41, 42, 43, 44, 45—Corn, oats, clover and wheat rotation.

The experiments in the value of standard fertilizers could be tested in this way:

Plots 10, 20, 30 40—Nothing.

Plots 11, 21, 31, 41—Apply manure.

Plots 12, 22, 32, 42—Manure and lime.

Plots 13, 23, 33, 43—Manure, lime and phosphorus.

Plots 14, 24, 34, 44—Manure, lime, phosphorus and potassium.

Plots 15, 25, 35, 45—Nothing, and, in addition, permit no vegetable matter to decay. Remove it.

All work can be done with hands and primitive tools. These experiments can be directed upon about thirty-five square rods or about one-fifth of an acre. This small tract of land will answer the same questions, in the same way, as the larger fields. The agricultural college in your province will doubtless be very glad to coöperate with you in connection with your experiments along the above lines.

ROTHSCHILD, *rote'shilt* or *roths'child*, a famous family of financiers and bankers.

Mayer Anselm Rothschild (1743–1812), the founder of the family, was born in Frankfort-on-the-Main. He proved most successful in his management of the fortune of the elector of Hesse-Cassel, and his family was given the patronage of the elector. All five of the sons of Mayer Anselm were made barons by the emperor of Austria. These five sons founded banking establishments in five of the large cities of Europe and established agencies at other places, both in Europe and in America.

Lionel Rothschild (1808–1879), a grandson of the first Mayer Anselm, was born in London and became the head of the London house of Rothschild. He was several times elected to Parliament, but each time he was refused the right to take his seat, because he declared he could not conscientiously repeat the last words of the oath—"on the true faith of a Christian." He virtually brought about Jewish emancipation in England.

Nathan Mayer Rothschild (1840–1913), the first Lord Rothschild, was raised to the peerage in 1885, and was the first of his race upon whom the honor was conferred. The various banking houses are still carried on by descendants of the Rothschild brothers.

ROT'TERDAM, NETHERLANDS, the chief commercial port and the second largest city of the country, is in the province of South Holland, on the Meuse River, about fifteen miles southeast of The Hague and forty-four miles southwest of Amsterdam. The city is divided into two parts by High Street. The old quarter is filled with quaint wooden buildings, while the new part is laid out with wide, well-kept streets, lined with substantial buildings. The principal buildings are the Saint Lawrence, a fifteenth-century church in the Gothic style, the exchange, the town-hall, the courthouse and the postoffice. North of the city is the large zoölogical and botanical garden, and west of the city is a beautiful park.

Shipbuilding constitutes the principal industry of Rotterdam, but others of importance are the manufacture of cigars, spirits, paints, chemicals and sugar. A thriving trade in butter, cheese, linen and flax is carried on. Rotterdam has a great system of docks and harbors, and the location of the city makes it an important center of maritime trade. The chief imports through Rotterdam are grain, ores, metals, coffee, tea, oil, tobacco and cigars. The same articles are reshipped for export, along with lumber and some animal products. Population, 1916, 487,077.

ROUBAIX, *roo bay'*, FRANCE, a city in the department of Nord, situated seven miles northeast of Lille, important as a center of the manufacture of textiles and also as the seat of the National School of Industrial Arts. The city was captured by the Germans in 1914, remaining under martial law until the German retreat from the Lille region. Population, 1911, 122,723.

ROUEN, *roo ahN'*, FRANCE, situated on the Seine, eighty-four miles northwest of Paris and fifty-six miles east southeast of Havre. The town is characterized by crooked, though picturesque, streets, and old houses, with quaint gables and carved timbers. Many specimens of medieval architecture have been retained, though in the newer part of the town the old streets and buildings have given

way to broad boulevards and modern structures. The city contains the finest Gothic cathedral in France; the Church of Saint Ouen is also worthy of note. Other buildings of note are the Palais de Justice, the Hotel de Ville, which contains the public library, and the archbishop's residence. There are in the city also a number of museums of antiquities and art collections of great value. In the Place du Vieux Marché, Joan of Arc was burned at the stake, in 1431, and a monument to her memory stands upon the spot.

Rouen has extensive docks, second only to those of Paris, and is an important commercial and industrial center. The leading industries are cotton spinning and the manufacture of coarse cotton goods, called *rouenneries*. Following this in importance are the manufactures of silk, chemicals, soap, machinery and foundry products and the refining of sugar. The city became an important post under the Romans and was formerly the capital of Normandy. It was captured from King John of England by Philip Augustus in 1204, but was returned to the English thirty years later. From 1419 to 1449 it was in possession of the English, from whom it was taken by the French under Charles VII. Population, 1911, 124,987.

ROUGE, *roozh*, a very fine scarlet powder, used by jewelers for polishing purposes and prepared from crystals of sulphate of iron, exposed to a high temperature. The name is also given to a cosmetic used in coloring the cheeks. See SAFFLOWER.

ROUGE-ET-NOIR, *roozh a nwahr*, (French, "red and black") or TRENTE-UN (*thirty-one*) or TRENTE ET QUARANTE (*thirty and forty*), a modern gambling game played with the cards belonging to six complete packs. The players are arranged about a table covered with green cloth, on which is a diagram showing four spaces, upon which money may be placed as a bet, namely, *rouge, noir, couleur* and *inverse*. The banker then deals a row of cards for noir, until the exposed spots number between 30 and 40 (face cards count 10, aces 1), and a similar row for rouge. The row wins which most nearly approaches the number 31, and players staking on the winning color receive their stake doubled. Couleur wins if the first card turned up in the deal is of the winning color; in the contrary case inverse wins. When the number of spots in both rows are equal it is a *refait*, or tie, and a fresh deal is made; but if both happen to count exactly 31 the banker claims one-half of all stakes. This last condition places the bankers at an advantage, calculated to be equal to about 1¼ per cent on all sums staked.

ROUGET DE LISLE, *roo zha' de leel*, CLAUDE JOSEPH (1760–1836), a French poet and composer, author of the *Marseillaise*, the national anthem of France. He was born at Lons-le-Saunier. In the army he rose to the rank of captain of engineers, but was twice suspended because he would not sanction the violent measures of the Revolutionary party. He was pensioned by Louis Philippe, and devoted his last years to music and poetry. In 1915 his body was placed with impressive ceremony in the Hôtel des Invalides, Paris. See MARSEILLAISE.

ROUGH RIDERS, the name given to the first regiment of United States volunteer cavalry in the Spanish-American War. It was organized by Theodore Roosevelt, who resigned his position as first assistant Secretary of the Navy to become lieutenant-colonel. The regiment was composed largely of cowboys. It won particular distinction at the battles of El Caney and San Juan. In 1899 a patriotic hereditary society was organized, to which members of the Rough Riders and their eldest sons, were admitted. See ROOSEVELT, THEODORE.

ROULETTE, *roo let'*, a game of chance, first played in the gambling rooms of Monte Carlo. The roulette (little wheel) lies in the center of a table covered with green cloth. This cloth is divided by lines radiating from the center of the wheel, and the spaces are marked *passe, pair, manque, impair*. There are also two diamond-shaped spaces, colored respectively red and black. The wheel has thirty-seven compartments—one marked *zero*, the rest numbered consecutively. *Manque* indicates numbers from one to eighteen, inclusive; *passe*, all numbers above that. *Pair* means even numbers; *impair*, uneven. An attendant, called a *croupier*, starts the wheel revolving, the bettors stake their money, and a small ivory ball is thrown off by the motion of the wheel into one of the numbered compartments.

ROUMANIA. See RUMANIA.

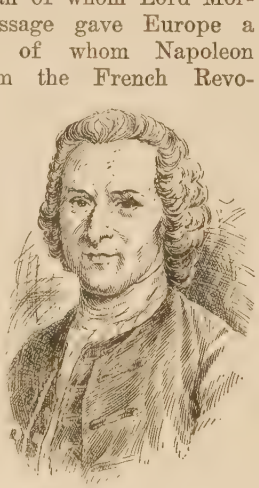
ROUND'HEADS, the name applied in derision to the members of the Puritan, or Cromwell, faction by the adherents of Charles I, at the outbreak of the Civil war in England in 1642. The members of the

Parliamentary, or Cromwell faction, were distinguished by having their hair closely cut. The adherents of Charles, who styled themselves *Cavaliers,* wore their hair in long ringlets.

ROUND TABLE, in the legends of King Arthur, the circular table about which the knights of his court took their seats, and, in consequence, the fraternity of knights itself. Each seat at Arthur's table bore the name of the knight to whom it was assigned. One called the Siege Perilous, was reserved for him who should prove worthy of the quest of the Holy Grail. The round table has been immortalized in song and story, the most famous piece of literature founded upon the legend being Tennyson's *Idylls of the King.*

ROUND TOWERS, a class of circular stone towers erected in the Middle Ages. Examples are found in Ireland, Scotland and Central Europe. They are from twenty to thirty feet in diameter, and from sixty to 130 feet high. The doors, from six to twenty feet from the ground, are reached by means of ladders; ladders also serve as stairs from floor to floor. The top story has four windows; each of the remaining stories has one window. These towers are thought to be the work of an early Christianized race who erected them as places of refuge and as watch-towers. They date from a period extending from the eighth or ninth to the thirteenth century.

ROUSSEAU, *roo so',* JEAN JACQUES (1712–1778), the man of whom Lord Morley said, "His message gave Europe a new gospel," and of whom Napoleon said, "Without him the French Revolution would never have occurred." Rousseau was one of the most brilliant and influential French writers of of the eighteenth century. But little is known of his early life, except that in his boyhood he was apprenticed to an engraver, from whom he ran away. He then fell under the care and influence of Madame de Warens, who sent him to a Catholic school. After leaving the institution he wandered aimlessly about Europe for a time, then returned to Madame de Warens, spending three years with her in her country home.



JEAN JACQUES ROUSSEAU

In 1741 Rousseau went to Paris, and in 1743 obtained the position of secretary to the French ambassador at Venice. He resigned in 1745 and returned to Paris, where he led a precarious life, copying music and studying science. In 1750 an essay, in which he adopted the negative side of the question whether civilization has tended to purify morals, won a prize offered by the Academy of Dijon. This for the first time brought Rousseau into general notice, and was the turning point in his career. He then began to study the philosophy of government and the social conditions of the country. During the next fifteen years he produced works which revolutionized the thought of the continent. The most noted of these are *Discourses on Inequality; Julie, or the New Heloise; The Social Contract;* and *Emile,* a treatise on education. An account of his life is given in his *Confessions,* a work of twelve volumes. *Emile* is the work by which Rousseau is most widely known at the present time. Many of the principles adopted by Pestalozzi and Froebel were taken from this work, and it may be said to have laid the foundation of modern education.

"Rousseau was a man of marked contrasts;" a character, says one observer, "in whom probably beyond all others, is to be found the greatest mixture of strength and weakness, of truth and falsity, of that which is attractive and that which is detestable." An opponent of the thought and tendencies of his time, he wrote with such force as to attract the attention and change the convictions not only of France, but of Europe.

ROWING, *ro'ing,* the art of propelling a boat over the water with oars. The oar was probably used before the sail. At all events, boats propelled by oars, with rudders for steering, were in use more than 3,000 years before Christ, and the ancient Greeks and Romans traveled in great galleys with rows of oars, one above another manned by slaves.

Rowing as a sport was not recognized until early in the eighteenth century. The first boat race on record occurred in 1715, and amateur rowing as it is known to-day began in England, in 1800. The first boat race between Oxford and Cambridge universities took place in 1829, and since 1856 the con-

test has been an annual event, except during the World War. Most English boat races are on the Thames, which has always been the favorite resort of amateur oarsmen. The most important English regatta is held annually at Henley, on the Thames. Australia holds an annual regatta, and in Canada rowing has made rapid progress since 1904.

Harvard, Yale and Cornell universities have led in ragattas in the United States, and the annual boat races between the crews of these universities are followed with interest throughout the country. The first races took place in 1843 and 1844, and ten years later the first amateur boat club was organized. The National Association of Amateur Oarsmen was formed in 1873. Occasional international regattas have been held between English and American oarsmen, in which the English have annually been victors.

Boats used in racing are long, narrow and light. Their walls are so thin that the boats are called *shells*. They are built for one, two, four, six or eight men. The best shells have movable seats.

ROWLAND, *ro'land*, HENRY AUGUSTUS (1848–1901), a distinguished scientist, born at Honesdale, Pa., and educated at Rensselaer Polytechnic Institute at Troy, N. Y. He was elected professor of physics in Johns Hopkins University in 1876 and held the position until his death. During his travels in Europe he studied the methods of instruction in different educational institutions and carried on extensive scientific research. To Professor Rowland is due, in great measure, the world-wide reputation of Johns Hopkins University as a great scientific school. Rowland became widely known through his inventions and discoveries in science. He was the originator of the multiple telegraph instrument and also succeeded in making the most perfect photographs of the solar spectrum, that have been secured.

ROYAL GORGE, *gorj*, a famous canyon through which the Arkansas River flows, in Fremont County, Central Colorado. It is eight miles long, and is one of the most picturesque gorges in America. The walls, which rise to a height of about 3,000 feet, are gorgeously colored.

ROYAL INSTITUTION OF GREAT BRITIAN, an organization founded in London by Count Rumford in 1799 "for the promotion, diffusion and extension of science and useful knowledge." Its original purpose was to give the laboring classes information in physics and mechanics, by means of lectures. However, lecturers of such note were engaged that all classes of students were attracted to them. The members are elected by ballot and pay an admission fee and an annual subscription.

The buildings include a library, a laboratory and a museum. In the laboratories some of the most valuable discoveries in chemistry and physics have been made. On the list of lecturers are the names of Huxley, Tyndall and Gladstone.

ROYAL NORTHWEST MOUNTED POLICE, the police force of the Canadian Northwest, known throughout Canada as the "mounties." The force was organized in the autumn of 1873, by an act of Parliament, for the purpose of assisting in governing the vast unsettled territory which had been ceded by the Hudson's Bay Company to the Dominion of Canada. The act which established the force provided that all the police were to be mounted and efficiently equipped, but without any finery. "As little gold lace and fuss and feathers as possible" was the motto of Sir John Macdonald. No person was to be appointed to the force "unless he be of sound constitution, able to ride, active and able-bodied, of good character, and between the ages of eighteen and forty years; nor unless he be able to read and write the English or French language." The Northwest Mounted Police was to be a civil force, though drilled in military organization.

From the very beginning it attracted high grade men. University graduates and noblemen have served in the ranks with the humblest. Another important characteristic of the men of the force is that they think for themselves. In the course of a patrol a sergeant may find himself called on to act in almost any capacity. He must be a man capable of meeting emergencies as they arise. Consequently the Northwest Mounted Police has always been a self-reliant body of men, yet a body well-disciplined.

Duties. There is hardly a department of Canadian government that is not assisted by these hardy troopers. They act as customs officials along the border. They carry the mails to distant mining camps, they report on the roads, bridges, crops and weather, and they take the census. They help travelers, and they are frequently called on to care for the sick.

Probably the most important duty of the police is to enforce law and order. In many of the remote districts they not only preserve the law, but make it and interpret it. The officers make regular trips throughout their districts to hold court. In tracking down criminals these men have many difficulties. It might seem that in the north, especially in winter, it would be almost impossible to detect a crime and punish the criminal. The records of the police prove the contrary. No detective force in the world can show a better record. No matter how small the crime, "Get the man," is the order. The murderer and the sneak thief are both criminals; though their punishment is different, both must be punished. Time and distance are no object. This attitude, absolute justice to every man, has earned for the mounted police the fear of all evil-doers and the respect and admiration of all good citizens.

Present Organization. As organized in 1919, the force included one commissioner, two assistant commissioners, twelve superintendents, forty-two inspectors, two surgeons, one veterinary surgeon, 1,200 non-commissioned officers and constables. The Yukon and the Northwest Territories constitute an area of more than 2,500,000 square miles. The remotest detachments are those on Herschell Island, on the shores of the Arctic Ocean, 2,500 miles from headquarters, and at Fullerton, on the northwest corner of Hudson's Bay.

During the World War many hundreds of the force took their discharge to serve in the Canadian and British army. Many of its members rose to high rank, six reaching the rank of general. Owing to the demands upon the force made by the war, it became necessary for it to withdraw from policing the provinces of Alberta and Saskatchewan. In December, 1918, the jurisdiction of the force was extended for Federal purposes to the whole of Western Canada from 86° longitude to the Pacific coast.

ROYAL SOCIETY, The, a scientific society in Great Britain, the most famous and influential scientific society in the world. In 1664 it began the publication of *Philosophical Transactions,* since 1750 published annually and containing the most valuable record of scientific developments in existence. Important scientific commissions which have been entrusted by the British government to the Royal Society have included the direction of the Royal Observatory at Greenwich by Isaac Newton in 1671, the correcting of the calendar in 1752, the protection of British ships from lightning, the measurement of a degree of latitude, the Antarctic expedition under Captain Cook in 1772, the Arctic expeditions under Parry in 1819, Sir John Franklin in 1845 and Nares in 1874, the determination of the density of the earth, the accurate comparison of systems of weights and measures and many other similar undertakings. Several trust funds and a library of 50,000 volumes are in the hands of the Society.

Admission to the Royal Society is difficult to secure, and the F. R. S. (Fellow of the Royal Society), which its members are allowed to write after their names, is a sign of great distinction. Fifteen new members may be admitted each year, and there may be representatives of other countries than Great Britain on the roll to the number of fifty.

RUBAIYAT, *roo bai'yat.* See Omar Khayyam.

RUBBER AND RUBBER MANUFACTURE. Rubber is an elastic gum made from the milky juice of a number of plants which grow in the tropical and semitropical regions of the world. The juice resembles the milk-white sap of the milkweed, and it is barely possible that plants of the milkweed family contain a small quantity of rubber.

How Rubber is Obtained. The hevea tree, which is found in large numbers in the forests of the Amazon, is the chief source from which rubber is obtained. The work is done by Indians. The sap, or latex, as it is called, comes from the inner layer of bark, and the tree is gashed just deep enough to reach this layer. The tool used resembles an ordinary hatchet. First a vertical gash, or channel, is made. Then slanting gashes connecting with this are made on one or both sides. The latex flows down these cuts to the main channel, and a cup is placed at its bottom to catch the fluid. The tapping is done early in the morning, and the latex is gathered a few hours later.

Making the Rubber. A pail of latex looks very much like a pail of milk, and if allowed to stand the rubber will rise to the surface like cream. But the water must be evaporated and the rubber coagulated at once, or the rubber will be injured. The Indian makes a small fire of sticks and palm

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THE RUBBER INDUSTRY

1—Native woman tapping rubber tree. 2—Carrying sap to central point. 3—One method of curing or "smoking" rubber. 4—Native tools: (a) for tapping trees; (b) cocoanut shell for carrying sap; (c) cup for catching sap; (d-e) paddles for "smoking." 5—Inspecting for purity. 6—African tree 14 months old. 7—Rubber tree leaves and seed. 8—Some manufactured products.

nuts, over which he places a clay cone having a small opening at the top through which the smoke escapes. He dips a wooden paddle into the latex and holds it in the smoke until the water is evaporated, leaving a thin coating of rubber. The paddle is again and again dipped into the latex and held in the smoke until a ball of rubber so large that it cannot be handled is formed. This ball, called a *biscuit,* is then cut open on one side, and the paddle is taken out. The biscuit is the form in which the crude rubber is placed on the market.

Other sources of rubber are the *castilloa* tree, also found in South America, the rubber trees and vines of the Congo region in Africa, and the *guayule* plant, a shrub that grows in Northern Mexico, some parts of Texas and in Arizona, where large plantations are under successful cultivation. Rubber is obtained from the guayule by grinding the plant, and then subjecting the material to a number of processes.

Rubber Manufacture. When the crude rubber reaches the factory it is run through a washing machine, consisting of a pair of toothed rollers over which water is flowing. The rollers break the rubber up into rough strips, and the water removes dirt and other impurities. The strips of rubber are dried and sent to the mixers, where sulphur and various other substances are mixed with it, to prepare it for the purposes for which it is to be used. Sulphur is the most universally used of all compounds; some of the other substances commonly employed are aluminite, asbestos, zinc oxide, white lead, whiting, china clay, mica and talc. It is at this stage of the manufacture that old rubber reclaimed from overshoes and other discarded rubber articles, is used. From the mixing machine the rubber goes to calenders, or rollers, from which it comes in sheets ready for use.

At no stage of the process is rubber melted. It may be warmed at times, but molded solid rubber goods are pressed into molds, not poured in. For rubber shoes, clothing, belting, hose, tires, etc., the rubber is combined with duck or some other strong fabric. This is done by laying a sheet of rubber on the fabric and pressing the two together between heavy rollers. Cloth for mackintoshes is prepared by laying a thin sheet of rubber between two layers of cloth and pressing them together. Tubing is made by pressing soft rubber through a mold. Rubber bands sold by stationers are cut from pure rubber hose.

Vulcanizing. Previous to 1839, rubber was considered of little commercial value, because no method of preparing it for practical use had been discovered, and all articles made from it were sticky in warm weather, and hard and brittle in cold weather. In 1839 Charles Goodyear, an American, discovered the process upon which the modern rubber industry largely depends. Goodyear found that by mixing sulphur with rubber and heating it its objectionable features were removed. The process is known as *vulcanizing,* because Vulcan was the ancients' god of fire. The term is now commonly applied to the process of repairing punctures in automobile tires. See GOODYEAR, CHARLES.

Commercial Importance. If we were to enumerate all the articles made of rubber or those into whose manufacture rubber enters, the list would be long. Without rubber, we could not have telephones, bicycles or automobiles as they are now made. Nearly all machines and appliances operated by electricity have some parts made of rubber. Then there are hundreds of small articles, such as combs, hot water bottles, knife handles, buttons, etc., that are so common that we never think of the material which enters into their manufacture. The World War revealed the importance of rubber in war, for it entered into many devices used in military operations.

The rubber industry was first developed in the United States, and that country still maintains its supremacy. Akron, Ohio, is the largest rubber manufacturing center in the world, and it uses nearly one-fourth of the world's supply of crude rubber. Most of the rubber for American manufactures comes from Brazil, Central America and Mexico. Africa and Ceylon supply most of the European mills. The demand for crude rubber has grown so rapidly that rubber plantations in Brazil, Mexico, Ceylon and other tropical countries have become very profitable. The cultivated trees produce more rubber and of a better quality than those growing wild.

History. The Spaniards who followed Columbus to Central America found that the Indians played with balls made from the juice of a tree. These balls were objects of curiosity, because, when they hit a hard object, they would rebound. Without doubt these were rubber balls. Probably the Indians had known of this substance for centuries, but they never made practical use of it. They

called the tree from which rubber is obtained *caoutchouc,* which means *weeping tree.* The name *rubber* was given this peculiar substance by the English chemist Priestley, the discoverer of oxygen. While experimenting with a ball of rubber, Priestley discovered that it would erase lead pencil marks, and so far as known this is the first practical use of rubber by civilized man. The term *rubber* is known only in the English language.

RUBENS, PETER PAUL (1577–1640), the foremost painter of the Flemish school. He was distinguished as a portraitist, a painter of religious and mythological subjects, landscapes and animals, and he was equally successful in depicting the peasant and the beribboned courtier. A courtier himself, with exceptional tact and a fluent use of six languages, he acted many times in a diplomatic capacity when Spain, Holland and England were involved.

PETER PAUL RUBENS

Rubens was born at the German town of Siegen, Westphalia. His mother was Dutch, and after the boy's father died the family lived at Antwerp. Here Peter Paul studied under the leading masters and in 1598 was himself recognized a "master" and admitted to the painters' guild. Two years later he went to Italy to study the works of the Italian masters, and there entered the service of the Duke of Mantua, for whom he executed numerous paintings and diplomatic services. He returned to Antwerp in 1608, became court painter to Archduke Albert, and the following year married Isabella Brant. He soon became the most sought-for painter in Europe. Commissions poured into his studio, and were arranged years in advance. He was knighted by Charles I of England and Philip IV of Spain. To this period belongs his greatest masterpiece *The Descent from the Cross,* in the Notre Dame Cathedral, Antwerp.

In 1622 Rubens was invited by the queen mother Marie de' Medici to Paris to decorate a gallery of the Luxembourg with allegorical pictures pertaining to incidents in her life. His wife died in 1626, and four years later he married Helene Fourment, a buxom young woman, who appears on many of his canvases. His life was successful and happy throughout, and his artistic power remained undiminished to the end.

Rubens' productivity was almost incredible. He executed about 1,500 pieces, which are distributed among the leading galleries. While he lacked the delicacy, restraint and grace of the Italians, he was not far behind the greatest Venetians as a colorist; and in the realm of the spectacular he is supreme. Life appeared to him as a pageant and on a large scale, and he had the gift to see the great panorama as a whole and in detail. His principal works include *The Crucifixion* (Antwerp Museum), *Emperor Maximilian I* (Vienna), *Lion Hunt* and *Children with Fruit Garland* (Munich Gallery).

RU'BICON, the river which Julius Caesar crossed with his legion in 49 B. C. when he entered Rome and defied the Republic, whose senate had passed a decree ordering Caesar to disband his army. When Caesar led his army across the river, he virtually declared war against the Republic. From this event the phrase "to cross the Rubicon" has come to mean to take some decisive step which commits one to a hazardous enterprise from which there is no retreat. The river is a small stream in Northern Italy, flowing into the Adriatic.

RUBID'IUM, a rare metal, discovered by Bunsen and Kirchhoff in 1860, by spectrum analysis. It is a white, shining metal, and at ordinary temperatures it is as soft as wax. It is usually found in connection with caesium, and it belongs to the group of the alkali metals.

RUBINSTEIN, *roo'bin stine,* ANTON GRIGORYEVITCH (1830–1894), a famous Russian pianist and composer. He studied at Berlin and Paris, taught for a time at Vienna and finally settled in Saint Petersburg, founded the Saint Petersburg Conservatory of Music and was director of it until 1867. Rubinstein made numerous concert tours of Europe, and in 1872, with the violinist Wieniawski, visited America. He was everywhere recognized as one of the world's greatest performers. His chief ambition, however, was in the field of composition, a field in which he was less successful. He composed chamber music, songs, symphonies, concertos and oratorios. These, while contain-

ing passages of wonderful beauty, have not a uniform excellence, and they are rarely heard to-day on the concert stage.

RUBLE, or **ROUBLE**, *roo'b'l*, a silver coin, the monetary unit of Russia. Its value was standardized in 1897, and remained fixed until the revolution of 1917. Formerly the ruble was equivalent to 100 kopecks and to 51½ cents in United States and Canadian money. Half and quarter rubles of silver were issued, as well as 15 and 7½ ruble gold pieces. After the overthrow of the imperial government the ruble declined steadily in value, and in 1919 the exchange rate was less than one-tenth of what it was originally.

RU'BY, or **RED SAPPHIRE**, a precious stone of a deep red color, of which there are two varieties, the oriental and the spinel. The *oriental ruby*, or *true ruby*, is a corundum, formed nearly exclusively of alumina; it is of great hardness, and is a perfect stone, having many times the value of a diamond of the same size, is the most valuable of all precious stones. Oriental rubies are found chiefly in Burma and Siam; inferior specimens have also occurred in North America and Australia. Genuine rubies of small size occur in stream gravels in Macon County, North Carolina. *Spinel rubies* consist of an aluminate of magnesium and are much inferior to the true rubies in hardness and value. They are found in Burma, Ceylon and Australia. The ruby is the birthstone for July. See PRECIOUS STONES.

RUDE, FRANÇOIS (1784–1855), one of the leading French sculptors of the nineteenth century, born at Dijon and educated at Paris and at Rome. After about twelve years spent in Brussels, he settled at Paris where, in 1828, he exhibited his *Mercury Fastening His Sandal* and shortly afterwards the *Neapolitan Fisher Boy*, both of which are now in the Louvre. Following there came a series of masterpieces which gave him rank among the greatest of French sculptors. He was equally at home in classic fields and in the modern realistic school, as his *Hebe and the Eagle*, *Amor Victor*, *Fisher Boy* and *Joan of Arc* bear witness. Rude executed a number of portrait statues and civic pieces, chief of which is a group entitled *The Departure*, representing the departure of volunteers from Paris in 1792.

RUFF, a species of sandpiper, from ten to twelve inches in length, which varies greatly in color, being principally brown, with white on the wings and belly. In the breeding season there appears on the neck of the male a group of long plumes, which when raised, form a kind of ruff, which has given its name to the bird. During the same season the male is disposed to fight any approaching bird or enemy. The females, who are more uniform and modest in coloring and lack the ruff, are called *reeves*.

RUFF

RUFFO, *ru'fo*, TITTA, an Italian baritone, pupil of Cassini of Milan, popular in both lyric and dramatic rôles. He has toured Italy and South America and has appeared with success in New York and Chicago. Among his greatest achievements are his rôles in *Pagliacci* and *Hamlet*.

RUG'BY SCHOOL, the most famous of the English public schools, was established at Rugby in 1567 by the will of Lawrence Sheriffe, a Rugby grocer. Because of litigation over the will, the school remained in obscurity during the first century of its existence, and during the next century it gained but little. Its wide reputation is due to the work of Thomas Arnold, who became head master in 1829 and completely revolutionized the system of instruction and discipline, placing both upon a much higher plane than English schools had previously known. Arnold's successors have followed his plan, and the school now takes high rank among English institutions. The course of study gives most attention to classics, but includes science, modern language and mathemathics. The number of students is about 600. The best description of life in this school during Arnold's administration is found in *Tom Brown's School Days*, by Thomas Hughes.

RUGS, floor coverings divided into two classes, known as *Oriental*, and *domestic rugs*. Orientals are the most durable and valuable of all rugs, and they are very expensive.
See ARNOLD, THOMAS.

Varieties of Oriental Rugs. The date of the origin of the making of Oriental rugs is lost in antiquity. The similarity in forms and inscriptions of ancient Egyptian architecture to the designs characteristic in the modern Oriental rug connects the art of rug weaving with that remote era. Oriental rugs are now generally divided into six groups, known as Persian, Bokhara, Turkish, Caucasian, Chinese, and Indian; each group has its subdivisions, the rugs taking the names of the districts and towns where they are woven.

The finest rugs made in the world, representing the most perfect conventionalization of flowers, leaves and other vegetation, come from Persia. No others can stand favorable comparison with the exquisite *Ispahan* creations of the sixteenth century, with their gorgeous foundations of Ispahan red with varied floral designs and fine tracings of puzzling, fascinating lines. Only a few perfect specimens now are counted among the treasured possessions in private collections. The most notable weaves of Persian rugs include the Kashans, the Kirmans, the Kurdistans, the Saruks, the Hamadans, Shirazes and Shenas. Both wool and cotton are employed in their weaving.

The Bokhara group, made in Central Asia, are distinguished by their very wide selvages and long fringes; their motifs are large and geometrical and are in dark red, outlined with black or white.

Caucasian rugs, also with uniform geometrical designs, are lighter in tone than the Bokharas. They are knotted rather than woven. The best-known weaves are the Daghestans, Shirvans, Kazaks, and Soumaks.

Turkish rugs are not so extremely rectilinear as the Caucasian rugs, the Ghiordes, Kulah, Melez and Bergamo being the most familiar. Most of the modern rugs now made in Turkey are of inferior type, excepting the very large examples from Persian wools woven in the sultan's works at Hereke.

Chinese rugs are very individual, with their dragons, unique varieties of the lotus flowers and odd geometrical designs distributed on harmonious grounds of gray blue, yellow, or cream. The warp of Chinese rugs is always cotton. Fine examples of Indian rugs come from Tanjore and Benares; they are distinguished by their medallion centers.

The Prayer Rug. The prayer rug, which all devout Mohammedans always carry with them, is one of the most pronounced patterns in Oriental rugs. Upon this rug the worshiper performs his devotions, his face and the point of the pattern being turned toward Mecca.

European and Domestic Rugs. The most familiar European rug is the *Brussels,* sold either as a rug, or "art square," as it is sometimes called, or as a carpet. Originally made in Brussels, it was copied in England, whence it was introduced into America. The *Wilton,* manufactured first in Wilton, England, is also made in Oriental patterns and has a

(Accompanying Article Rulers of the World, page 3131)

COUNTRY	RULER	ACCESSION	TITLE
Abyssinia	Zeoditu	1916	Empress
Afghanistan	Amanulla	1919	Ameer
Argentina	Hipolito Irigoyen	1916	President
Austria*			
Belgium	Albert I	1909	King
Bolivia	Gutierrez Guerra	1917	President
Brazil	Epitachio Pessoa	1919	President
Bulgaria	Boris I	1918	King
Chile	Juan Luis Sanfuentes	1915	President
China	Hsu Shi-Chang	1918	President
Colombia	Marco F. Suarez	1918	President
Costa Rica	Federico Grandac	1917	President
Cuba	Mario G. Menocal	1913	President
Czecho-Slovakia	Thomas G. Masaryk	1918	President
Denmark	Christian X	1912	King
Ecuador	Alfredo B. Moreno	1916	President
France	Raymond Poincaré	1913	President
Germany	Friedrich Ebert	1919	President
Great Britain	George V	1910	King
Greece	Alexander I	1917	King
Guatemala	ManuelE.Cabrera	1898	President
Haiti	Philippe S. Dartiguenave	1915	President
Hedjaz	Hussein	1916	King
Honduras	Francisco Bertrand	1916	President
Hungary*			
Italy	Victor Emmanuel III	1900	King
Japan	Yoshihito	1912	Emperor
Jugo-Slavia*	Price Alexander	1918	
Liberia	Daniel Howard	1916	President
Luxembourg	Charlotte	1918	Grand Duchess
Mexico	Venustiano Carranza	1917	President
Netherlands	Wilhelmina	1898	Queen
Nicaragua	EmilianoChamorro	1917	President
Norway	Haakon VII	1905	King
Panama	Pedro A. Diaz	1918	President
Paraguay	Manuel Franco	1916	President
Persia	Ahmed Miraz	1909	Shah
Peru	Don Jose Pardo	1915	President
Poland*			
Portugal	Canto y. Castro	1918	President
Rumania	Ferdinand I	1914	King
Russia			Soviet Republic
Salvador	Carlos Melendez	1915	President
Santo Domingo	Federico H. Carvajal	1916	President Regency
Serbia			
Siam	Chowfa Maba Vajiravudh	1911	King
Spain	Alfonso XIII	1902	King
Sweden	Gustaf V	1907	King
Switzerland	Gustav Adoe	1919	President
Turkey	Mehmed VI	1918	Sultan
United States	Woodrow Wilson	1913	President
Uruguay	Balthazar Brum	1919	President
Venezuela	Juan V. Gomez	1915	President

*In process of formation of new government in August, 1919.

velvetlike surface. The *Axminster,* likewise named after a small English town where it was first manufactured, is a comparatively inexpensive yet attractive copy of Turkish designs. A variety of Axminster, known as *Smyrna,* with the nap, or pile, on both sides, is now extensively manufactured in the United States.

RUISDAEL, *rois'dale,* JACOB VAN. See RUYSDAEL, JACOB VAN.

RULERS OF THE WORLD. The table on page 3130 lists the rulers of the world in 1919. A comparison of this list with a similar one before the World War shows the growth of the sentiment for democracy. Among the great powers, Austria-Hungary disappeared as a government, to be replaced by republics. Germany and Russia changed from autocratic to democratic forms of government, and various new republics were erected out of territory formerly under autocracies.

RUM, a strong alcoholic liquor, obtained by distilling molasses and the refuse derived from the manufacture of cane sugar. Pure rum is colorless. Its brown tint is imparted to it by the addition of caramel and by storing it in casks that have contained sherry. Most of the rum is manufactured in the West Indies, and the name *Jamaica rum* is applied to the best grade, regardless of its place of manufacture. The strength and quality improve with age. Rum contains a large percentage of alcohol, and can therefore no longer be manufactured or sold in the United States and Canada.

RUMA'NIA, a kingdom in the southeastern part of Europe, one of the several nations of that continent which have achieved national independence by throwing off the Turkish yoke, Rumania has been a free country since the Russo-Turkish War of 1877–1878. At that time it included the former principalities of Moldavia and Wallachia (united in 1861), and the district known as the Dobruja, which was ceded by Bulgaria. By the Treaty of Bucharest (August, 1913), at the close of the Balkin Wars, Rumania acquired an additional territory of 2,969 square miles, and at the outbreak of the World War in 1914 its total area was 53,489 square miles, about the same as that of the state of Arkansas.

Rumania lies north of Bulgaria and west of the Black Sea. In the extreme west it is separated from the Serbia of 1914 by the Danube River. Before the dissolution of the Austro-Hungarian monarchy in 1919 it was bounded by Austria-Hungary on the west and north, the two being separated by the Carpathian Mountains. It also touched Russia on the north and was separated from that country on the east by the Pruth River. The outcome of the World War, in which Rumania fought with the entente against the Germanic alliance, resulted in an enlargement of Rumanian territory and a change of the boundaries adjoining former Austria-Hungary and Russia. Rumania claimed or was promised Transylvania and the Banat of Temesvar, which had belonged to Hungary; Bukowina, an Austrian crownland, and Bessarabia, in the extreme southwest of Russia. Rumanian possession of the Banat was disputed by the Jugo-Slavs, and the Ukrainians claimed Bessarabia and Bukowina. The permanent boundary lines of Rumania were to be decided by the League of Nations.

The People. The population of Rumania at the outbreak of the World War was 7,508,000. Nine-tenths of this number were Rumanians, and the rest were Jews, gypsies, Bulgarians, Serbs, Germans, Hungarians, Turks and Armenians. There are several million Rumanians inhabiting Transylvania, the Banat, Bukowina and Bessarabia, and it is on this fact that Rumania based its claim to the territories in question. The Rumanians are not Slavs. They claim to be direct descendants of the Roman colonists sent by the Emperor Trajan into the province of Dacia (modern Rumania), but authorities regard them as a mixture of the original inhabitants of the region with Romans, Teutons, Slavs and Mongols. Their language is derived from the Latin, and is more like Italian than any of the other Romance languages. Orthodox Greek is the state religion.

Government and Education. The government is a constitutional monarchy, the throne being hereditary in the male line of descent. The king is assisted by a Cabinet consisting of eight Ministers and a Premier, who is the president of the council. The legislative power is vested in a Senate and a Chamber

of Deputies, the members of each being chosen by ballot. The Senate consists of 120 members, elected for eight years, and the Chamber of Deputies, of 183 members, elected for four years. Education is free and compulsory, but there are not enough schools as yet to take care of the population. However, conditions are improving, and the former high rate of illiteracy is slowly being reduced. There are two universities, located at Bucharest, the capital, and at Jassy.

Physical Features. The Carpathian Mountains form most of the boundary between Rumania and Transylvania and constitute an unbroken barrier. Spurs of these mountains extend into the country for short distances, but in the main Rumania is an extensive low plain. The northern portion is occupied by a tableland, which slopes toward the south and in which the rivers have worn deep channels. The southern part of the country slopes from the Carpathians, or Transylvanian Alps, toward the Danube. The eastern portion, along the Danube, is low and marshy and rises but little above the level of the sea. The Danube forms most of the southern boundary and that portion of the western boundary which separates the country from Serbia. Near the eastern end of Rumania the Danube flows northward and then again eastward into the Black Sea. The Dobruja is that portion of the country lying south and east of the river. The important tributaries of the Danube are the Aluta, the Dinbowitza and the Jalomitza, draining the southern part of the country; and the Sereth and its tributaries, draining the northern part.

The climate is similar to that of the adjoining portion of Russia. The winters are intensely cold, the thermometer sometimes falling as low as 20° below zero. The summers are hot, and the rainfall is irregularly distributed throughout the year, being heaviest in June, while the late summer months are usually dry. The mean annual temperature at Bucharest is 51°, and the mean temperature for July, 73°.

Resources and Industry. The country is rich in minerals. Gold is found in the beds of some of the streams. There are also ores of iron, lead, clay, silver, copper and manganese, and deposits of coal. Salt is found in large quantities and has been mined for ages. Marble of excellent quality occurs, as do clay and sand suitable for glass and porcelain ware. These and common building materials are widely scattered over the country. The most valuable mineral is petroleum. In the Carpathian foothills are some of the most profitable oil fields in the world, and though the wells were seriously damaged during the war, their reconstruction was begun as soon as Rumania was cleared of German forces. Before the war their output was about 1,750,000 tons a year.

The lowlands are covered with a fertile soil, and agriculture is the leading occupation, giving employment to about eight-tenths of the population. Rumania is one of the most important grain-producing countries in Europe and raises large quantities of wheat and Indian corn, the annual crop of the former being about 90,000,000 bushels and of the latter, about 110,000,000 bushels. Barley, rye and oats are also produced in quantity. Grapes and other fruits are grown in the foothills of the mountains and large quantities of wine are made. Prunes are also extensively cultivated. Considerable attention is given to the raising of live stock, and large numbers of horses, cattle, sheep and swine are grown and exported.

Before the World War the peasants owned about one-third of the arable land, the rest being in the hands of large proprietors, who rented it out in small sections. This system was the source of much discontent, and tended to create a feeling of hostility between the peasants and the proprietors. In February, 1919, the Rumanian Parliament passed a land reform measure whereby the large estates were divided among the peasants, making Rumania a country of small farmers. The former proprietors, who were permitted to retain only fifteen per cent of the arable land, were assured a yearly income from the state as recompense for giving up their holdings.

There are nearly 7,000,000 acres of forest land, the principal trees including oak, beech, pine, fir, maple and elm.

Rumania is not a manufacturing country in the modern sense of the term. There are many flour mills and oil refineries, but most of the manufactured products needed by the population are imported or made in limited quantities in the homes.

Transportation and Commerce. The Danube is the chief waterway, and it serves as an important means of transportation for the produce of the country. Lines of railway also extend through the country from the

north to south and from east to west and connect its leading cities with those of neighboring countries. There are about 2,400 miles of railway, most of which is owned by the government. The exports consist of wheat, corn, wine and other agricultural products; and the imports are manufactured goods, machinery and such foodstuffs as are not profitably grown within the country.

History. The territory now included in Rumania was occupied in ancient times by a people called Dacians, and formed a part of the Roman Province of Dacia. During the Middle Ages the independent principalities of Moldavia and Wallachia were organized out of the territory. Later these became tributary to Turkey, but during the nineteenth century Russian aggression brought them under the influence of the czar. The Rumanians endeavored to secure their independence, and after the Crimean War the two principalities united in 1861, but continued tributary to Turkey until the Berlin Treaty in 1878, when the European powers acknowledged their independence. Soon after, the present government was organized. Rumania did not take part in the first Balkan War against Turkey, but it sided with Serbia and Greece in the second phase of the struggle against Bulgaria, and was rewarded by receiving nearly 3,000 square miles of territory formerly belonging to Bulgaria. This territory was formed into the two districts of Caliaera and Duroster.

In October, 1914, King Charles, the Rumanian sovereign, died, and was succeeded by his nephew, Ferdinand. In August, 1916, Rumania entered the World War by declaring war on Austria-Hungary, and began an offensive into Transylvania. The German staff sent Von Mackensen and Von Falkenhayn to direct a counter-offensive, and, attacked by Germans, Austrians and Bulgarians, the Rumanians were soon swept back, while the enemy not only cleared Transylvania but occupied Wallachia and the Dobruja. Rich stores of grain and oil fell into German hands and helped relieve the desperate economic situation in the central empires. In November Bucharest was abandoned by the Rumania government, which removed to Jassy, in Moldavia.

Though crushed, Rumania remained loyal to the allies, and withdrew from the war only when the Bolshevik government of Russia made peace with Germany, leaving the smaller country helpless. It is known that Rumania's untimely entrance into the war and its speedy collapse were the result of an intrigue between Germany and the treasonable reactionaries who had control in Russia before the downfall of the czar. Betrayed by the old Russian government and deserted by the new, Rumania signed a peace treaty with the central powers on May 6, 1918, which, if carried out, would have left the nation practically a vassal state. The subsequent collapse of Germany prevented this result, and in the fall of 1918 the Rumanians saw their country cleared of the enemy. The Ministry which had concluded peace went out of office when the armistice between Germany and the allies was signed, and in December, 1918, the king and queen reëntered Bucharest at the head of their troops. The queen is of English birth, but deeply loves her adopted country. A new Cabinet headed by Jean Bratiano took office, and proceeded to formulate a vigorous reconstruction policy, based on universal suffrage and land reform.

Related Articles. Consult the following titles for additional information:

Balkan Wars
Bessarabia
Bucharest
Bukowina
Danube
Dobruja
Jassy
World War

RUMELIA, *ru mē'lia*, the name formerly given to a division of Turkey, in Europe, which comprised ancient Thrace and a part of Macedonia. The name signifies "the land of Rome" and was given to the country because when the Mohammedans conquered the Byzantine they considered the inhabitants of this section of Europe Romans.

RU'MINANTS, the name of that order of animals that chew the cud. Cattle, sheep, goats and deer are the most common representatives of the order in America. The camel, the antelope and the llama also belong to the order, which includes nearly all of the most useful domestic animals. With the exception of the camel, the ruminants have no incisors or cutting teeth in the upper jaw. When a cow or a sheep feeds it thrusts out its long tongue, seizes a bunch of grass and tears it off, and this mouthful of grass mixed with saliva is swallowed into the first stomach. Later, when the animal is resting, this food is brought upward into the mouth in small quantities and thoroughly masticated between the large molar teeth. The food is then swallowed into the second stomach, where it is digested. All ruminants have

hoofs, and they belong to the division *Ungulata,* or hoof-bearing animals.

RUMP PARLIAMENT, in English history, the name given the remnant of the Long Parliament after the majority of its members had been expelled by Cromwell's soldiers under Colonel Pride, in 1648. Only sixty members remained, and these in conjunction with the army brought about the condemnation of Charles I. These members constituted the *rump,* and the body was ever after known as the *Rump Parliament.* It was forcibly dissolved by Cromwell in 1653 for opposing the demands of the army. It was reinstated twice later, but for only brief periods. In March, 1660 it decreed its own dissolution.

RUNES, *roonz,* the earliest written characters of the ancient Teutonic people of Northwestern Europe. They are formed almost invariably of straight lines, and are found engraved on monuments, tombstones, rings and weapons. Occasionally a manuscript of later date contains them. Traces of runes are found in those parts of England that were first conquered by the Angles and Saxons, especially in Northumbria, Mercia and East Anglia. Runic inscriptions abound in Scandinavia, Denmark and Iceland.

The origin of these characters is not known, but Anglo-Saxon tradition ascribes their invention to Odin. Instruments and weapons bearing runic inscriptions dating from A. D. 300 to 400 have been found in Norway. The name is believed to be the same as the Anglo-Saxon word *run,* meaning *mystery.* The inscriptions were associated with the magical rites of heathen worship; for this reason their use was forbidden by the early Christians, and they were gradually forgotten. The latest runic inscriptions in Sweden date from about 1450.

RUNJIT SINGH, *run jeet' Sing'h',* (1780–1839), maharaja of the Punjab, India, and founder of the Sikh kingdom. His father, a Sikh chieftain, died in 1792, and the government fell into the hands of his mother. At the age of seventeen, however, Runjit rebelled against his mother's authority and assumed the power himself. The shah of Afghanistan granted him possession of Lahore, which had been taken from the Sikhs, and Runjit soon subdued the small Sikh states to the north of the Sutlej. The chiefs to the south of that river invoked the protection of the British, who made an arrangement with Runjit in 1809, accepting the Sutlej as the south boundary of his dominions. The ambitious prince now organized his army after the European model, with the help of French and English officers, and steadily extended his power, assuming the title of raja in 1812. His boundaries continued to widen until, by 1819, he was ruler of the entire Punjab, with title of maharaja, or king of kings. In 1836 he suffered a heavy defeat from the Afghans, but he retained his power until his death.

RUN'NIMEDE, the meadow on the right bank of the Thames, in Surrey, England, four miles below Windsor, where King John met the barons who compelled him to sign Magna Charta, June 15, 1215. The actual signing is said to have taken place on Magna Charta Island, opposite Runnimede. A race course now occupies the site of Runnimede. See MAGNA CHARTA.

RU'PEE, the unit of value in the monetary system of British India. The weight of a rupee, 180 grains (troy), 165 grains of which are of pure silver, is fixed by the British government. The value of the coin as currency, which formerly fluctuated, is also fixed at the equivalent of thirty-two cents in United States or Canadian money. One-sixteenth of a rupee equals an *anna.* Other denominations are half-rupees, quarter rupees and eighth rupees. A *lakh* equals 100,000 rupees; a *crore,* 100 lakhs.

RUPERT'S LAND, the name formerly applied to a vast tract of land bordering on Hudson Bay and then belonging to the Hudson's Bay Company. The territory was granted to the Hudson's Bay Company by Charles II of England, and was held by them until 1869, when the title was surrendered to the British government. In 1870 the title was transferred to the Dominion of Canada. The boundaries were never definitely determined. The territory was formerly known as *The Canadian Northwest.* That portion of it north of the organized provinces is now known as the *North West Territories.* Rupert's Land was named for Prince Rupert, the first governor of Hudson's Bay Company.

RUP'TURE. See HERNIA.

RURAL CREDITS. The Federal Farm Loan Act became effective July 17, 1916. It provides for a national system of rural credits in the United States on the following plan:

The Federal Farm Loan Board. A Federal Farm Loan Board, consisting of five

members, of whom the Secretary of the Treasury is *ex officio* chairman, is established in the Department of the Treasury at Washington, D. C. Four members are appointed by the President, with the advice and consent of the Senate; their term of office is eight years, and not more than two members can belong to the same political party. The members devote their entire time to the work of the Board and receive an annual salary of $10,000 each. No member of the Board shall, during his term of office, "be an officer or director of any other institution, association or partnership engaged in banking, or in the business of making land mortgage loans or selling land mortgages." One of the members is designated as Farm Loan Commissioner.

Federal Land Banks. The United States, exclusive of Alaska, is divided into twelve districts, known as Federal land bank districts. There is a Federal land bank in each district, and each Federal land bank may, subject to the approval of the Federal Farm Loan Board, establish branches within its district. Each bank is under the management of a board of directors, who choose from their own members a president, a secretary and a treasurer. When the subscription to the stock of any Federal Land Bank amounts to $100,000 a permanent board of nine directors is chosen; six are chosen by the national farm loan associations of the district, and three are appointed by the Federal Farm Loan Board.

Before beginning business each Federal Land Bank is required to have a capital of at least $750,000. The capital stock is divided into shares of five dollars. This stock may be held by any individual, firm, corporation, or by the government of any state or of the United States. Stock held by national loan associations cannot be transferred.

National Farm Loan Associations. Persons desiring to borrow money on farm mortgage security are required to form organizations known as national farm loan associations. Articles signed by those forming the association are filed with the Federal Land Bank for the district. Each association chooses its own board of not less than five directors. The board of directors chooses a secretary-treasurer, who is the executive officer of the association. The other officers are a president, a vice-president and a loan committee of three members.

The secretary-treasurer collects and receives all money due the association, such as interest, partial payments on loans, and principal, and forwards the money to the Federal Land Bank of the district in which the association is located.

Only farmers or those about to become farmers can become members of national farm loan associations. Each member is required to subscribe for stock in the association to the amount of five per cent of the loan for which he applies.

How Loans are Secured. 1. A farmer wishing a loan should join the nearest national farm loan association, paying in $5 for one share for every $100 he wishes to borrow.

2. He should make application to the association for the loan, giving his personal note therefor, secured by a first mortgage on his land.

3. The land is examined, and if his application is approved the Federal Land Bank forwards the money to the secretary-treasurer of the association, who pays it over to the farmer.

No commission brokerage is charged the farmer, and his rate of interest cannot exceed six per cent.

Restrictions. No loan will be granted for less than $100 nor for more than $10,000. In any case the loan cannot exceed fifty per cent of the value of the land and twenty per cent of the buildings and other improvements included in the mortgage.

Loans will not be made on land not occupied or tilled by the owner. They are granted for the following purposes:

(a) To purchase land for agricultural purposes.
(b) For equipment, fertilizer and live stock.
(c) For improving and erecting buildings.
(d) For the discharge of a prior mortgage.

The borrower is required to use the money for the purposes for which it was loaned.

Advantages. The rural credit system offers the farmer the following advantages:

1. It enables the farmer to borrow money, within the limits of his security, at fair rate of interest and without having to pay high commissions.

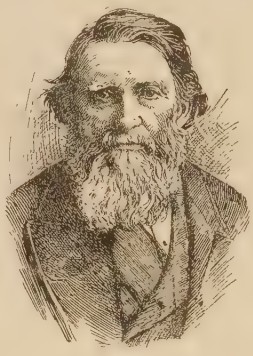
2. It provides for long-time loans—not less than five nor more than forty years—on a plan of easy yearly payments, so when the loan falls due the final payment will be small.

RURAL HIGH SCHOOL. See HIGH SCHOOL.

RUSH, a plant of the sedge family, which grows in marshes and on the banks of streams and ponds. The smooth, leafless stems grow

to a height of three feet. They are tough and flexible and are used in making baskets, chair-bottoms and mats. The various species of rush are found in swampy places the world over. See HORSETAIL RUSH; BULRUSH.

RUSKIN, JOHN (1812–1900), one of the most eminent English art critics, authors and social reformers of the nineteenth century, was born in London. His parents were Scotch, and they attended carefully to his education. He studied at Christ Church, Oxford, and before his graduation won the Newdigate prize for his poem *Salsette and Elephanta.* In 1843 he produced the first volume of his *Modern Painters,* a great work on art criticism. Other volumes appeared at intervals during the next seventeen years. *The Seven Lamps of Architecture* and *Stones of Venice,* criticisms on architecture, followed.



JOHN RUSKIN

In 1860, with the publication of *Unto this Last,* Ruskin appeared as a social reformer; and he engaged actively in the work which he championed in his writing. He improved the condition of several tenement houses, had streets cleaned and, in fact, devoted the greater part of his fortune to the improvement of the working classes. From 1871 to 1879 and from 1883 to 1884 he was Slade professor of art at Oxford, but was obliged to resign on account of ill health.

Besides the works already mentioned, Ruskin wrote, among others, *Fors Clavigera,* a series of letters to the workingmen of England; *Poems; Sesame and Lilies; Ethics of the Dust; The Crown of Wild Olive; The Queen of the Air; Mornings in Florence,* and *Praeterita.* Eloquence, force and subtle analysis are the prevailing characteristics of Ruskin's literary style, and his works are permeated with a lofty enthusiasm for truth and beauty and with a generous sympathy for the poor and the weak. He is most widely known among children for his beautiful fairy tale *King of the Golden River.*

RUSSELL, ANNIE (1864-), in the generation now passing, one of the leading American actresses, born in Liverpool, England, but taken to the United States in early childhood. Her parents were Irish. Miss Russell's first stage appearance was at the age of eight, in Montreal, Canada; not until 1881 did she achieve success in the United States, when she appeared in *Esmerelda* in New York City. Seven years later she began a London career, and in 1904 she was married to Oswald Yorke, an English actor. Her time thereafter was nearly divided between American and English engagements. Among her greatest successes are numerous Shakespearean revivals.

RUS'SELL, JOHN, Lord, Earl Russell (1792–1878), an English statesman, the son of the Duke of Bedford. Educated at a private school and at Edinburgh University, he entered Parliament in 1813, before attaining his majority. In 1819 he made his first motion in favor of parliamentary reform, the great question of which he was the champion through life. His influence in the Liberal party steadily increased, and though temporarily unseated in 1826, owing to his advocacy of Catholic emancipation, he carried a motion in 1828 against the Test Acts and thus led to their repeal. In 1831 he was paymaster-general in Lord Grey's administration, and though not in the cabinet, he introduced the first Reform Bill to the House of Commons. In the exciting struggle that followed, Lord Russell was popularly accepted as the great champion of reform. In Lord Melbourne's second cabinet, Russell was home secretary, and in 1839 he became a colonial secretary. From 1841 till 1845 he led the opposition against Peel (See PEEL, SIR ROBERT), with whom, however, he was in sympathy on the Corn Law Question; and when Peel resigned in 1846, Russell formed a ministry which remained in power until February, 1852. He reëntered office in December, 1852, as foreign secretary under Lord Aberdeen, and in 1855 he became colonial secretary in Lord Palmerston's cabinet. He represented Great Britain at the Vienna Conference.

A period of rivalry between Russell and Palmerston ensued, which, however, ended in 1859, when the former became foreign secretary under his old chief, through whom he was raised to the peerage in 1861. In 1865 Russell succeeded Palmerston in the leadership of the Liberal party, but when his new reform bill was rejected in 1866, the Liberals resigned. Thenceforward Earl Russel held no office.

RUSSELL, LILLIAN (1861–), an American actress and light-opera singer, born at Clinton, Iowa. Although she had appeared earlier in amateur theatricals, she made her first professional appearance at eighteen, in *Pinafore.* She became prima donna of the McCaull Opera Company and later, as head of her own company, presented *Virginia and Paul, Polly, The Queen of Brilliants, Fiddle-dee-dee, Lady Teazle, The Butterfly,* one of her foremost successes, and *Wildfire.* She was later seen in vaudeville, but retired from the stage after her marriage, in 1912, to A. P. Moore, owner and editor of the Pittsburgh *Leader.* In 1918 she appeared again briefly in musical comedy.

RUSSELL, SOL SMITH (1848–1902), an American actor, born in Brunswick, Maine. As a drummer boy he was with the Federal army during the Civil War, and after the close of the war he began to play small parts. At Saint Louis, in 1865, he achieved his first real success, and two years later joined Augustin Daly's company, rising to stellar heights in 1880 in *Edgewood Folks.* His greatest success was won in *Peaceful Valley, A Poor Relation* and *A Bachelor's Romance*—plays written for him and well suited to convey the sentiment and comedy and the gentle and whimsical moods which this actor so admirably expressed.

RUSSELL SAGE FOUNDATION, an institution founded in 1907 by Mrs. Russell Sage, who gave $10,000,000 for its endowment. The purpose is "the improvement of social and living conditions in the United States of America," but it does not seek to improve conditions by merely relieving distress. Its object is to remove the causes of poverty and distress. The work of the Foundation is carried on by departments. The most important departments are those of Charity and Organization; Child Helping; Remedial Loans; Recreation, and Education. The Department of Recreation has done much to further the use of school buildings as social centers. The Department of Remedial Loans has been active in exposing the methods of loan sharks.

The Russell Sage Foundation House Company has constructed at Forest Hills Gardens, on Long Island, a number of attractive and convenient houses at remarkably low prices. These are rented to families of moderate income. In this way the Foundation is trying to solve the housing problem in a large city.

Peasant in Sabbath garb

RUSSIA, *rush'a,* the fatherland of the greater portion of the Slavic race. In 1914, the year which witnessed the outbreak of the World War, the name Russia stood for a great empire in Europe and Asia, extending from the Baltic Sea to the Pacific Ocean, and ruled by a czar who held dominion over one-sixth of the land area of the globe. This name stood also for despotism; for oppression of the masses; for the exiling of lovers of freedom; for the rule of the privileged classes, who represented but a small fraction of the population. Farsighted observers knew that a Russian upheaval was coming sooner or later, but outbreak of the World War, in which Russia's Slavic millions rallied to the defense of their friends in the Balkans, seemed to unite the people and to check the smoldering fires of revolution. The war, however, could not indefinitely postpone the rising of the masses. The storm broke early in 1917; then followed the downfall of the imperial government, and a long period of desperate suffering on the part of the people, as they struggled to reconstruct their nation.

In April, 1919, Premier Lloyd George, in a speech in the British House of Commons, said in respect to Russia:

> "You are dealing with a nation which, after being misgoverned for centuries, has been defeated and trampled to the ground, largely through the corruption, inefficiency, and treachery of its governments. Its losses have been colossal. All that largely accounts for the frenzy that has seized upon that great people. That is the reason why the nation is going through untold horrors of a fanatic and lunatic experiment."

The "fanatic experiment" to which the Premier referred was the rearing of a government based upon the rule of the working classes, with the elimination of the aristocracy and the middle class. This system, commonly called Bolshevism, was established in Russia in the fall of 1917, after a moderate Socialist régime had failed. The significant thing for the rest of the world is that the Russian idea of the rule of the "proletariat"

was accepted by radicals in nearly all other countries, and a movement was started to bring about a world revolution. As for Russia itself, its condition after 1918 can best be described as one of political chaos. To understand what took place the reader should get a view of the former empire.

Old Russia. The area and population of the Russian domain at the outbreak of the World War are shown in the table:

Division	Sq. Mi.	Population
Russia in Europe	1,997,310	149,764,000
Russia in Asia	6,294,119	29,141,500
Finland	125,689	3,277,100
Internal Waters	347,468	
	8,764,586	182,182,600

Russia in Europe extended from the Arctic Ocean to the Black and Caspian seas, and from the Ural Mountains to the Baltic Sea and the former boundaries of Germany and Austria-Hungary. It occupied over half of the continent, and was about two-thirds as large as the United States. Russia in Asia included Siberia, the Steppes Provinces, Turkestan and Transcaspia. In this vast empire there was a great diversity of races and peoples, not only in the Asiatic portion but in the European. In Asia the czar ruled over 6,000,000 Russians, and numerous Armenians, Mongols, Persians, Turkomans,

People	Number	Location
Great Russians	65,000,000	Center of European Russia; also in north and east
Little Russians	20,000,000	The Ukraine, north of the Black Sea
White Russians	6,000,000	Four governments in the west
Cossacks (Little Russians in speech)	3,000,000	East and southeast
Poles	8,000,000	Poland and western provinces
Germans	2,000,000	Baltic provinces, Poland, south Russia
Swedes	300,000	Finland
Finns and Karelians	3,500,000	Finland
Esthonians	650,000	Baltic regions
Letts and Lithuanians	3,500,000	Baltic regions, Lithuania, Poland
Iranians	1,300,000	Caucasus
Rumanians	1,100,000	Bessarabia
Jews	5,000,000	Southwest, west

Tatars and other Orientals. The complexity of nationality in European Russian is indicated by the summary above.

Revolutionary Russia. When the czar was overthrown the empire began to disintegrate. It had been kept intact by force, and its diverse peoples had no bond of loyalty or of common interest to hold them together. This process of disintegration proceeded very rapidly under the régime of the Bolsheviki, though the Bolshevik leaders raised and trained a great army to hold their dominion over the new nations fringing the central region of European Russia. By the summer of 1919 they still held sway over several million of Great Russians inhabiting the central region. In March, 1918, they had transferred the seat of government from Petrograd to Moscow, because of its central location. There was another reason, also, for this removal. Petrograd was too near the frontier allied nations would not react unfavorably upon the new government. Indeed, it was feared its leaders might be captured by opposing Russians.

In the extreme north, at Archangel, an anti-Bolshevik government was being maintained through military assistance of the allies, chiefly Great Britain. Along the Baltic Sea the provinces of Esthonia, Courland and Livonia were struggling to maintain themselves as independent republics, fighting valiantly against Bolshevik troops and economic chaos. Lithuania, south of the Baltic provinces, and Finland were in an equally precarious state. The Russian Poles, joining cause with their kinsmen in Austria and Prussia, had reconstructed the old Polish state and proclaimed an independent republic, but new Poland was forced to fight on all fronts, owing to boundary disputes with the Ukrainians, Czecho-Slovaks and Germans, and the efforts of the Bolsheviki to extend their system over the country. The Ukraine, which had previously set up an independent government, was partially reconquered by the Bolsheviks in the spring of 1919. The Cossacks in the southeast and those in the Ural Mountains region kept up a desperate struggle to prevent the extension of Bolshevism into their territory, while Siberia was protected from a Bolshevik invasion by the Russian forces of Admiral Kolchak and Czecho-Slovak troops. Siberians and Cossacks fought together along the Ural River. In other words, after 1918 European Russia became a discordant nation fighting small wars on its outer edges over thousands of miles of front. Its ultimate boundaries and the fate of the young nations established

in former Russian territory are matters that only the future can determine.

Under the Bolshevik Régime. For the events preceding the seizure of the government by the Bolsheviki see the subhead *History,* below. On November 7, 1917, control of affairs passed from Alexander Kerensky and the moderate revolutionists to the radicals, or Bolsheviki, headed by Nikolai Lenine and Leon Trotzky. The name Bolsheviki is the Russian for *belonging to the majority,* and was originally applied to the radical wing of the Socialist Democratic party, which, under the leadership of Lenine, had separated from the moderate wing in 1905. At the outbreak of the World War Lenine was living in Cracow, Austrian Poland. He had at first been interned there, but later was permitted to go to Switzerland, from which, through an arrangement made by the provisional Russian government with Germany, he was given a passport to return to Russia. He arrived in Petrograd in May, 1917, and immediately began agitating peace. Effecting a working agreement with the radicals of the social revolutionary party, composed of peasants, he soon had a large following, and by November succeeded in grasping the reins of power.

The Soviets. What may be called the Russian Soviet Republic was then established. *Soviet* means *committee.* At the time of the first revolution soviets sprang into being all over the country, in the army regiments, in the factories and in the villages. Each soviet managed the affairs of the particular group of which it was a part. When the Kerensky government fell the Bolshiviki utilized these local committees to build up a structure in which they had supreme power. All who differed from them were eliminated, and by this process Bolshevism and sovietism became one and the same thing. At the bottom of the system are the local village soviets, which elect representatives to the district soviet on a basis of one deputy to every 1,000 population. This district soviet in turn elects representatives to the province soviet on the basis of one deputy to every 10,000 population.

These province soviets in turn elect representatives to the territory or state soviet, one deputy representing 25,000 population from all these country soviets. From the great city soviets delegates are elected to the all-Russian convention on a basis of one deputy for 25,000 city electors, and one representative for every 12,500 country population. This All-Russian convention of soviets is called not less than twice a year and is the supreme authority of the republic. Participation in elections is limited to those who favor Bolshevism, and all others are barred. Thus there was established in Russia a new kind of autocracy, the dictatorship of a particular class.

This system has been defended on the plea that the vast majority of the Russian people are peasants, and that the rule of the soviets is majority rule. It has been condemned as being forced on city workers and ignorant peasants, and as excluding from political rights the minority middle and upper classes, a practice contrary to democratic principles. Defenders of Russian sovietism say that a Bolshevik dictatorship was needed to prevent the counter-revolutionists from reëstablishing the monarchy, and that necessity forced the Leninites to adopt autocratic methods. As to the plea that the peasants and city workers support the Bolsheviks, the truth seems to be that they favored the Lenine program of peace and bread for the city dwellers and land and peace for the peasants. Peace "at any price" was made with Germany in February, 1918 (see *History,* below), and an attempt was made to reconstruct the entire economic system. It was popular belief in Lenine and his promises that gave him his initial power with the people.

Signing a treaty with Germany, however, did not bring peace. As has been stated, there was warfare with anti-Bolshevik groups all around the circle. Moreover, the allied blockade, which cut Russia off from outside trade, greatly complicated the internal situation. Russia could not obtain clothing, medical supplies, needed foodstuffs and the thousands of necessities that make for decent, comfortable living. Manufacturing, transportation and all those activities upon which the economic life of a nation depends became badly demoralized under the burden of civil war, the blockade and the transition from private to public ownership. The Lenine school of thought believes in communism, or the complete abolition of private ownership of all agencies of production.

A correspondent of a great American newspaper, writing in the spring of 1919, summed up the situation in these words:

"Russia's discontented millions have not thought of the consequences of reaction, and

there is no check on the blind, angry, determined dissatisfaction that is growing. Millions will welcome a change and that is as far as they have thought.

But this much can be said without hesitancy: No government except a radical government, built more or less along Socialistic lines, will ever last in Russia. The peasant is going to get the land, and all the land, for his own, and nothing is going to cheat him out of that. The city workman is going to have at least a part of the say about how his factory is run, how much he is to be paid, and his working conditions.

His factory committee is always going to be an active, radical part of the life of industry. Any future government whether it be Communist or Kolchak, must honestly represent the great masses and the great majority—which neither do at the present moment. No dictatorship of the proletariat or a dictatorship of the Communist party or a dictatorship of the reactionary aristocracy or bourgeois landlords will last for long—it will have to be a rule of the people, by the people.

The city workmen and the country peasants may not set all these things down in words, but they will never be satisfied with anything else. Primarily, they want the comforts of life, then decent liberties, and a decent share in the government and daily affairs.

Though they could not give the people home comforts, the Bolshevik leaders did secure for them cultural privileges unknown under the czarist régime. Schools for children and adults were established on the plan of organization adopted in the United States, and theaters and art galleries opened for them in Moscow and other cities. Concerts, lectures and entertainments are attended by those to whom such pleasures were once unknown.

Physical Features. Russia proper is a vast plain, which is divided into northern and southern slopes by a height of land, which passes in an irregular direction from a little north of the middle point in the Ural Mountains to the point on the Baltic where the boundaries between Russia and Germany unite. This height of land attains its greatest elevation in the Valdai Hills, directly south of Petrograd. These have an elevation of a little over 1,000 feet. On the south are the Caucasus Mountains, which have an elevation of over 18,000 feet, and to the west of these is a range of low mountains in the Crimea, which attains an altitude of about 4,000 feet. In the northern part of the eastern boundary are the Urals, reaching at the northern extremity an altitude of about 7,000 feet, though having an average height of from 4,000 to 5,000 feet.

Russia has a number of large and important rivers. To the north of the watershed and flowing into the Arctic Ocean or its coast waters are the Petchora, draining the northeastern part of the country; the Mezen; the Dvina, flowing into the Gulf of Archangel, and the Onega, flowing into the Gulf of Onega; while those flowing into the Baltic or its coast waters are the Neva, the Düna, the Niemen and the Vistula, which in the lower part of its course flows through Prussia. Of the great rivers flowing southward we find the Ural, the Great Uzen, the Volga and the Cuma, flowing into the Caspian; the Don, flowing into the Sea of Azov, and the Dnieper, the Bug and the Dniester, flowing into the Black Sea. All of these streams are navigable in the lower parts of their courses, and some of them are navigable for many miles. Russia has a number of large lakes, nearly all of which are situated in the northwestern part of the country. The largest of these, Lake Ladoga, north of Petrograd, is about the size of Lake Ontario and is the largest lake on the continent of Europe. To the northwest of this, in Finland, are other large lakes, all of which are in a low country and have marshy borders. The Caspian Sea, with its surface eighty feet below the Mediterranean and entirely enclosed by land, is really a salt lake, and the Black Sea might also be considered in the same light.

Climate. Russia extends through nearly thirty-five degrees of latitude; consequently it has a varied climate, the extreme northern part being within the Artic regions and the southern part falling within the warm temperate regions. The absence of mountain barriers causes the country to be swept alternately by winds from the north and the south; therefore it is subject to sudden and violent changes in temperature. The western portion also has a more equable climate than the eastern, because it is much nearer the sea. The mean temperature at Petrograd for January is about 15°, and for July it is about 64°, while at Odessa, the Black Sea, it is much warmer. The average rainfall for the entire country is about twenty inches a year, but it is much greater in the northwestern than in the southeastern portions. The entire country in winter is usually covered with a heavy fall of snow and this adds much to the moisture and is of great advantage to agriculture.

Mineral Resources. Russia has an abundant supply of minerals, the most valuable being platinum, iron, copper, coal, salt, zinc, gold and silver. Coal is found in large quantities in the south-central part of the country, in the valley of the Donetz River. Iron occurs in the Ural Mountains, which are the depository of many other metals. In Caucasia are some of the most productive petroleum fields known to the world. Malachite, emeralds, diamonds and other precious stones occur in the Ural Mountains, and amber is found in the coasts of the Baltic. Building stone is not plentiful, but porcelain clay and clay suitable for brick and tile are found in a number of places. The lowlands along the Baltic contain extensive peat bogs. There are others, also, near Moscow, and these are an important source of fuel.

Agriculture. Over one-third of the area of the land is covered with forests. These occupy a belt stretching across the country immediately south of the frozen tundra in the north. The trees consist of pine, larch and other evergreens, with a few hard woods. South of this and extending across the central part of Russia and southward along the western border to the Baltic Sea is a great area of black fertile soil, embracing over 225,000,000 acres. About three-fifths of this has been put to cultivation. The chief crops are normally rye, oats, wheat, barley, potatoes and sugar beets. The great wheat belt is in the southwestern part of the country, while the more hardy cereals are raised farther north. Rye, which is the greatest food plant of the country, can be raised universally. In the southern part of the country, along the Black Sea, apples, plums, grapes, apricots and other fruits are successfully grown, and this region has become noted for its wines. Cattle, horses, sheep, goats and swine are raised throughout the country, and in the more favorable localities in the south dairying has become an important branch of agriculture.

Other Industries. In the forest region lumbering and the manufacture of potash, tar, turpentine and other forest products engage a large number of inhabitants. The fisheries of the country are also very important. Notwithstanding its numerous lakes and rivers, all of which are well stocked with fish, the country is unable to supply the local demand. The inhabitants of the extreme north are engaged to a large extent in hunting and trapping and derive considerable revenue from the sale of furs and the feathers and down of water fowl.

Transportation. Russia has comparatively little seacoast and few important ports, but the vast plain occupying most of the country makes it possible for boats to navigate nearly all of the streams, most of which have been canalized. In addition to these, there are many miles of canals connecting the different river systems, so that it is possible for boats to pass from the White Sea to the Caspian Sea and the Black Sea and from the Caspian Sea to the Baltic Sea. European Russia has a larger canal mileage than any other country in the world, and in addition to this there are 36,000 miles of railways, which radiate from Petrograd and Moscow.

Russia formerly had an extensive commerce, carried on chiefly with Great Britain and Germany. The United States also had an important share. The exports consisted almost wholly of wheat, flour and leather, while the imports were raw material for manufactures, particularly cotton; manufactured goods, including clothing, machinery and scientific instruments, and foodstuffs. There will be excellent business opportunities for outside investors when a settled condition of international affairs permits the economic rebuilding of the country.

Literature. The oldest writings in the history of Russian literature are translations from the Old Church Slavic language of religious works, parts of the Bible and rituals for Church service. The most important of the earliest writers was Nestor, who lived early in the twelfth century, and who wrote a celebrated *Chronicle*, which is not extant. From the time of the destructive invasion of the Mongols, in the thirteenth century, until the seventeenth century, life in Russia was on a low plain intellectually, but under Peter the Great literature began to revive. Not only did the new literature show forth the national spirit, but it began to have a distinctly European character. Throughout the eighteenth century the growth continued, and to one man of that century, more than to any other person, belongs the credit for fixing the literary form of the language. This was Lomonosoff (1711-1765), whose most important works were his writings on versification and rhetoric. During the reign of Catharine II, French influence was paramount, but this was superseded about the end of the eight-

eenth century by English and German influence, and the sentimentalism then in vogue in those two countries made great headway in Russia.

Nineteenth-century Russia is represented in literature by many writers of importance, the greatest of whom are Alexander Pushkin, one of the greatest of Russian poets; Gogol, Turgenieff and Tolstoy.

History. In the ninth century Russia was inhabited by numerous tribes of Slavs, who had come, how long before is not known, from the neighborhood of the Carpathian Mountains. The total lack of union among the tribes made the Slavs an easy prey to invaders, who swept in upon them from all sides. Finally, about the middle of the ninth century, the Scandinavians, under their leader, Rurik, were invited by the Slavs to enter the country, assume rule over it and protect it from invasion. Rurik's power grew rapidly, and by 862, the date usually given as the foundation of the Russian Empire, he ruled from Novgorod a wide empire. Rurik died in 879, and Oleg, a member of his family, was made regent for Rurik's son. Under Oleg the capital of the country was removed to Kiev, and an attack was directed against Constantinople so successfully that the Byzantine emperor was obliged to pay a ransom for the city.

Gradually the descendants of Rurik strengthened and widened their kingdom, which came in time to be called Russia, probably from the name given by the Finns to the Scandinavians. Under Vladimir the Great (980-1015), the Greek form of Christianity was introduced into the country, and an effort was made to better the religious and intellectual condition of the people. By the end of the eleventh century the Russians had reached a plane of civilization little lower than that of the peoples of western Europe.

In the first half of the thirteenth century, however, the Mongols swept over Russia, and this invasion put an end to all self-government, to all intellectual progress, in fact, to all civilization. The country was cut off from western Europe, and the nationalization of the Slavs was delayed for centuries. Gradually Moscow became the strongest of the principalities of eastern Russia, and it was a grand prince of Moscow, Dmitri IV, who in 1380, by his victory over the Mongols, took the first step in the liberation of the country from the foreign yoke. As the principalities came to recognize that, disunited, they could never hope to become free, they laid aside their dissensions and joined for the overthrow of the Tartars. Ivan the Great (1462-1505) succeeded in breaking the power of the Mongols by turning the different hordes against each other, and Ivan the Terrible (1533-1584) extended Russian rule over Kazan, Astrakhan and part of Siberia.

Following the strong rule of Ivan the Terrible came a period of anarchy and disorder, which ended with the election, in 1613, of Michael Romanoff to the throne. During the reign of Alexis, the son of Michael, considerable territory was acquired in a war with Poland, and a protectorate was assumed over the Polish Cossacks. Alexis left three sons of whom the oldest, Feodor, ruled but six years, expressing at his death the wish that his half-brother, Peter, should succeed him, rather than Ivan, the rightful heir, who was almost an imbecile. However, Peter's sister, Sophia, ambitious of power, succeeded in having Ivan proclaimed joint sovereign with Peter, intending to retain the power in her own hands. In the struggle which followed, Peter proved the stronger, Sophia was forced to retire to a convent and Peter became in reality the sole ruler of Russia, although Ivan was allowed to retain the title of czar. It is from the reign of this sovereign that the real greatness of Russia dates.

At the death of Peter (1725) the crown passed to his wife, Catharine, who was succeeded two years later by Peter's grandson, Peter II (1727-1730). The reigns of Peter, Anna Ivanovna (1730-1740) and Ivan (1740-1741) were of no great importance in the history of the country, but during the reign of Elizabeth Petrovna (1741-1762) occurred the Seven Years' War between Austria and Prussia, in which Russia took part on the side of Austria. Peter, the successor of Elizabeth, was murdered within a short time of his accession, and his wife came to the throne as Catharine II. Under Catharine Russia assumed a more prominent position among the European nations than ever before, and the genius of the queen enabled the country to support its position well. The partitions of Poland, by which Russia gained great accessions of territory, took place during Catharine's reign, and the Crimea was annexed in 1783. A war with the Turks (1787-1792), in which Russia was successful, advanced the boundaries of Russia to the Dniester.

Paul I, the son of Catharine, succeeded her on the throne and ruled from 1796 to 1801. At the outset of his reign, he seemed favorable to reform, but he speedily changed his policy and enacted repressive measures that were so galling as to be almost unendurable. Finally he was assassinated; and his son, Alexander I, came to the throne. Alexander seemed fitted both by nature and by training for his position. He was a man of high ideals and of courage enough to carry them out. Among his first acts were the freeing of the serfs in the Baltic districts, the abolishing of the system of paid espionage and the discontinuance of torture as a legal punishment.

On the death of Alexander, in 1825, his brother, Nicholas I, came to the throne. Like Alexander, Nicholas began his rule in a liberal manner, but fell back later upon a policy of repression, overcome by the difficulties which met the reformer. His foreign relations led to war with Persia, participation in the Turkish defeat at Navarino, and finally to the great struggle known as the Crimean War, before the close of which Nicholas died. His successor, Alexander II, was forced to accept the Treaty of Paris, which took from Russia a part of Bessarabia and her protectorate over the Danubian principalities. Another war with Turkey, begun in 1877, resulted much more favorably for Russia, but she was obliged by the other powers to give up a part of her gains.

At the outset of his reign, Alexander began a series of radical reforms, but before his death he had adopted the old reactionary policy and had become very unpopular. He was assassinated in 1881, and his son, Alexander III, came to the throne. One of the most lasting in its results of any of the events of the reign of Alexander III was the agitation against the Jews. Many privileges were taken from them by law, and persecutions of all sorts were begun against them. With varying severity, this persecution has continued to the present day. On the death of Alexander III, in 1894, his son came to the throne as Nicholas II. He made few changes in his father's policy, continuing especially the attempt to advance Russian interests in the East. Railways were constructed in Asiatic Russia, and trading posts were everywhere established. In 1895, at the close of the war between China and Japan, Russia came into possession of the Chinese peninsula of Liao-tung, on which Port Arthur is situated. This port was of the utmost importance to Russia, as affording an ice-free outlet for her Siberian commodities. Constant efforts were made to make the district about Port Arthur thoroughly Russian in language and in commerce, Korea was seized on some pretext and the annexation of Mongolia was attempted. No opportunity was overlooked for sending Russian soldiers into Chinese territory, and by the close of the Boxer trouble in China, Manchuria and half of Mongolia were firmly held by Russia.

Backed by the European powers, Japan protested against the aggressions of Russia and brought such pressure to bear that the evacuation of the territory by October, 1903, was promised by Russia. Later it became evident that the czar was still hoping to annex the territory which he held, and Japan, fearing for Korea, of which she considered herself the natural guardian, saw that she would be obliged to drive Russia from Chinese territory. On February 6, 1904, the Japanese representative left Petrograd, and two days later active hostilities began. For the military events of the war, see RUSSO-JAPANESE WAR.

The complete defeat of Russia in this struggle had some beneficial effects on the country. It aroused the people to a sense of the inefficiency of their government and showed them the corruption which existed in the official life of the country. This awakening had begun, however, long before the close of the struggle. Throughout the war Nicholas II had showed himself utterly unable, by reason of his vacillating disposition, to deal with the grave situation which confronted him. The reactionary class, which was completely in control, prevented the spread of education among the poorer classes, reduced the peasants to the condition of mere slaves; forced them to give most of their earnings in taxes to support the favored classes—in short, brought the country to a condition little different from that of France previous to the Revolution. The damage done to Russian trade by the war with Japan threw hundreds of thousands of laborers out of work, race wars broke out among the different peoples within the country, and everywhere demands for freedom were made.

The czar seemed at first ready to grant concessions, but the reactionary party was

too strong, and the petitions for representative government were refused. The spirit of revolt spread; peasant risings occurred; the national troops, in their attempts to quell the disturbances, were resisted by armed forces, and the crew of the warship *Potemkin* mutinied and cruised from one Black Sea Port to another. At length the czar found himself compelled to grant certain reforms and, most important of all, to promise the assembling of a representative legislative body. Mere promises of reform, however, were looked upon with suspicion by the revolutionist party, which was to be satisfied with nothing less radical than the proclamation of a democratic republic, and violent outbreaks constantly occurred in different parts of the country.

The promised legislative body, the Duma, held its first session on May 10, 1906. After ten weeks of free discussion of conditions in Russia, during which important demands were made upon the czar, amounting in substance to the relinquishment of his autocratic power and the granting of real administrative control to the people, the czar dissolved the Duma, July 21. A second Duma, elected on a greatly restricted franchise, assembled March 1, 1907, and was dissolved by the edict of the czar on June 17. The third Duma met in November, but soon adjourned to meet on June 21, 1908. This Duma was chosen as the result of the arbitrary action of the government, and did not fully represent the people. It favored the government and continued to sit until 1912. The sessions of the fourth Duma began in November, 1912. The freedom of action of the Duma, though in theory almost unlimited, was greatly lessened by the influence of the bureaucracy.

The World War. In July, 1914, affairs were approaching a crisis in Russia, and the time seemed ripe for a new revolution. Then came the Austrian attack on Serbia and Russia's defense of the small Slavic nation, the outcome of which was the opening of the European war (for details of this critical period, see WORLD WAR). The imminence of war overshadowed the domestic situation, and it was seemingly a united Russia that entered the struggle. An offensive in Austrian Poland (Galicia) was a brilliant success, but in the summer of 1915 the Russian troops were badly defeated by the Austro-Germans, who drove them out of Galicia, recaptured Lemberg and Przemysl, forced the capitulation of Warsaw and threatened Vilna and Riga. The Russian people were roused to intense indignation by these disasters, which were the result of inefficiency and even treachery in the government. Russia was betrayed by its own officials, some of whom had been carrying on an intrigue with Germany from the beginning of the struggle. In this treasonable business the czarina herself had a hand, but the czar was probably blameless. Munitions were deliberately withheld from the troops, and there was general disorganization of all military departments.

In spite of the efforts of the traitors, a powerful organization for carrying on the war efficiently was functioning. This was the All-Russian Zemstvos Union, representing a league of all the zemstvos in the country. Under the old system Russia proper was divided into governments for local administration. Each government was divided into districts, and in the regions inhabited by the Great Russians and Little Russians each district had an elected assembly called the zemstvo. The duties of the zemstvos included the administration of charity, public health, education, etc., the construction of public works and the supervision of other matters concerning the district. These assemblies by uniting for war work accomplished miracles for the disorganized country. Up to October, 1916, the Zemstvos Union, in coöperation with other societies, had established over 3,000 military hospitals and had distributed vast quantities of supplies among the troops. The work of these societies showed the possibilities of the nation could it be freed from the paralyzing rule of the old bureaucracy. Another vital factor in the progress of democracy was the ukase of the czar prohibiting the sale and use of vodka, the national beverage. The elimination of drinking and drunkenness had much to do with ridding the people of their inertia.

Though Russia's withdrawal from the war in 1917-1918 prolonged the struggle, the country saved the day for the allies by keeping Germany and Austria occupied in the east while Britain was creating its great army. Russia had lost nearly 5,000,000 men by the end of 1916, and was then approaching exhaustion. The Pro-German elements in the government, who had helped bring about this exhaustion, were working for a separate peace with Germany early in 1917, and only

the outbreak of the revolution forestalled this allied disaster.

The Revolution of 1917. Throughout February and March strikes, food riots and mob demonstrations prevailed in Petrograd and Moscow, and on March 11 the government ordered the dissolution of the Duma. Instead of dissolving, the Duma, in the person of its president, telegraphed a defiance to the czar, and the troops began seizing the Cabinet ministers. Among those arrested was former Prime Minister Stürmer, who had been openly accused in the Duma of being a traitor. Shortly after, the Duma voted a resolution authorizing the executive council of the assembly to establish a provisional government, and on March 15 the czar was required to sign a manifesto declaring his abdication and that of the heir apparent, Alexis. On the same day a coalition Cabinet was formed, at the head of which was Prince Lvoff, organizer of the Zemstvos Union, and the representative of the business men and landowners. Professor Paul Milyukof, Minister of Foreign Affairs, represented the Constitutional Democrats (also called cadets), and Alexander Kerensky, Minister of Justice, represented the most powerful group, the workingmen and soldiers. Kerensky was a Socialist, but without radical tendencies.

The new government endeavored to carry out a program of reform, but it was soon evident that the Cabinet was not radical enough to satisfy the masses. In May the pacifist elements forced the resignation of Milyukov, who was suspected of imperialistic tendencies. To Kerensky, who was then moved up to the position of War Minister, fell the task of organizing an offensive among soldiers who had lost all heart for fighting. The army was daily becoming more disorganized. The Workmen's and Soldiers' Council in Petrograd was demanding that the allies state their war aims, and urging a program of no indemnities and no annexations. Lenine, who had returned to Petrograd in May, began a vigorous peace propaganda that later had its effect. In June the Duma was abolished by the Workmen's and Soldiers' delegates, who were becoming increasingly powerful.

In the midst of this confusion Kerensky was steadily coming forward as the most satisfactory representative of the people, and in July he became Prime Minister. A threatened revolt by Lenine and his followers was put down, but this favorable move was offset by news of military disaster in Galicia, where the Russian troops had begun a promising offensive. The campaign was ill advised and should not have been undertaken, for discipline had relaxed, the troops had lost their morale and the number of desertions was appalling. It was soon evident that Russia was no longer an asset to the allies, and the allied governments then hoped only for passive resistance. The Lenine propaganda, however, became too strong for Kerensky to overcome. On November 7 the Bolsheviki seized Petrograd, and on November 9 the All-Russian Congress of Workmen's and Soldiers' delegates named a Cabinet with Lenine as Premier and Trotzky as Minister for Foreign Affairs. Kerensky, supported heroically but futilely by the cadet soldiers and the women's "Legion of Death," fled, the peasant army went over to the new government, and Russia entered upon a new phase of its revolution.

Later Developments. The system under which the government functioned thereafter has already been described. On his accession to power Lenine began to put his Bolshevik program into effect. In regard to domestic matters, decrees were issued placing all factories in the possession of workmen, abolishing private ownership of land, and giving to the state possession of mines, forests and waterways. As a part of his foreign policy, Lenine proposed to all the belligerents that they declare a general armistice, and he published certain secret documents stored in the Russian archives. These were treaties made between Russia and its allies, and their publication was for the purpose of persuading the people that the allies were as imperialistic as Germany. No reply having been received to his proposals to the allied belligerents, Lenine declared the Russians were justified in making peace with Germany, and on December 14 an armistice was signed at the ruined city of Brest-Litovsk, the German headquarters in the east. After several weeks of negotiation, a treaty was concluded at this place, by which Russia signed away the right to one-thirtieth of its territory and one-fifth of its population. All sovereignty over Esthonia, Livonia, Courland, Poland, Finland and the Ukraine was relinquished, representing 298,650 square miles, and Russia promised to demobilize its army and to release German prisoners. It was Germany's inten-

tion of making the relinquished provinces German principalities, and only its own defeat, a year later, defeated this plan. The Treaty of Brest-Litovsk, which was a terrible blow to the allies, was ratified by a congress of soviets at Moscow, in March, 1918.

Opposition to the Bolshevik régime developed in many sections, and Trotzky, who was made Minister of War, began the training of an immense revolutionary army. As has been stated, divisions of the "Red Army," as it was called, in the course of the next few months were fighting allied troops in the Archangel region, Esths, Finns, Letts, Poles, Ukrainians, Cossacks and Siberians. The size of Trotzky's army was variously estimated, some observers putting it as high as 3,000,000 in the summer of 1919.

Lenine took no part in the deliberations of the peace conference which began sessions in Paris January, 1919, as his government up to that time had received official recognition from none of the allies. Certain attempts were made to enter into an agreement with him whereby food and other supplies would be sent to Russia, but though he made various concessions as to assuming Russia's public debt and reëstablishing trade, he refused to stop hostilities against the non-Bolshevik groups. However, in January, 1920, the blockade against the country was lifted.

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Archangel	Moscow
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Kishinev	Tiflis
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GEOGRAPHICAL DIVISIONS

Bessarabia	Esthonia	Lithuania
Bokhara	Finland	Poland
Circassia	Georgia	Siberia
Courland	Livonia	Turkestan
Crimea	Ural	Ukraine

LAKES

Ladoga Onega

RIVERS

Dnieper	Don	Vistula
Dniester	Neva	Volga

HISTORY

Alexander, I, II, III	Lenine, Nikolai
Berlin, Congress of	Nicholas, I, II
Bolsheviki	Nihilists
Catharine I, II	Paul I
Cossacks	Peter I
Crimean War	Russo-Turkish Wars
Holy Alliance	Trotzky, Leon
Ivan, III, IV	World War

RUS'SO-JAPANESE' WAR, a war between Russia and Japan, beginning in February, 1904, and continuing until September, 1905. The chief cause of the conflict was Russia's attempt to gain control of Manchuria and Korea, and thus make its position in the Far East so strong that it could dominate Japan. At the close of the war between China and Japan in 1895, Japan had won control of Formosa and Liao-tung Peninsula, including Port Arthur. The leading European nations, however, forced Japan to cede Liao-tung back to China, and Russia immediately leased this peninsula. Russia had already gained control of Sakhalin Island, had completed the Trans-Siberian Railway and established ports at Vladivostok and Port Arthur, notwithstanding the repeated protests of Japan, which saw its very existence threatened by these movements.

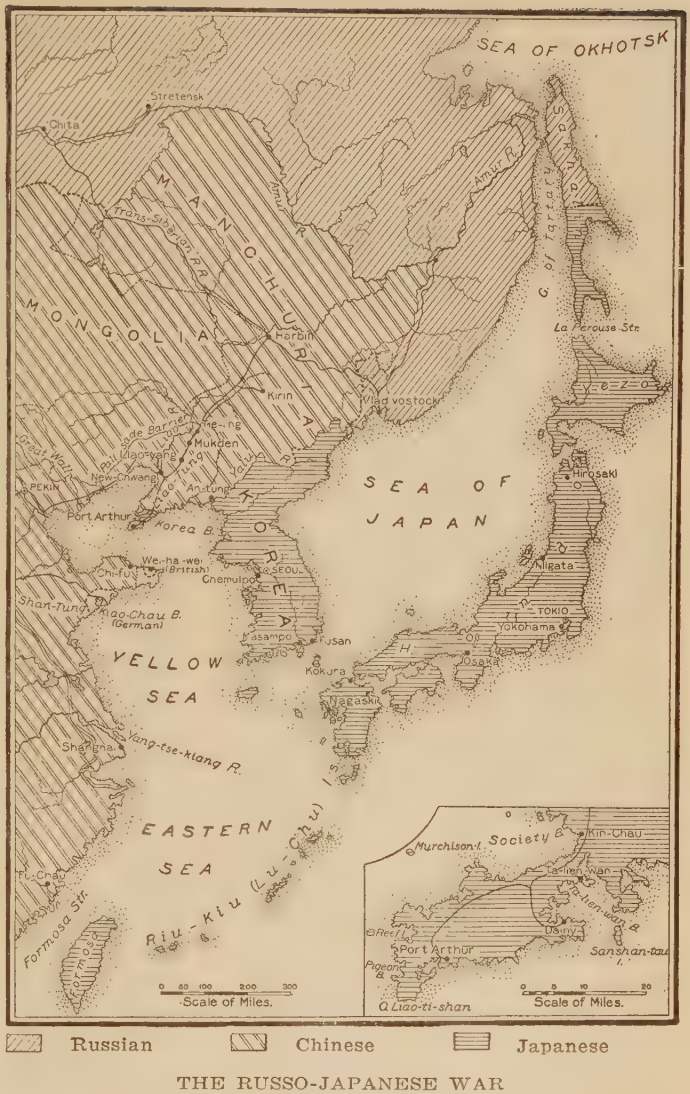
Resources of the Combatants. Russia was far superior to Japan in numbers and material, but Japan had the better trained army. Moreover, while Russia had about 80,000 troops at the seat of war, Japan had over 200,000 at hand, while it required weeks and months for Russia to ship men and supplies from Petrograd (Saint Petersburg) to the front, Japan could render its armies in the field all possible assistance in a few hours' notice. It was Russia's policy, therefore, to delay engagements until reinforcements from Europe should arrive. On the other hand, it was Japan's policy to strike at once.

Siege of Port Arthur. From the first, the capture of Port Arthur was the chief objective of the Japanese. The first attack was made by Vice Admiral Togo, on February 8, 1904. The Russian fleet suffered great damage, and the Russian forces withdrew to the land forts. Port Arthur was blockaded, and the Russian general Kuropatkin was dislodged from his position and retreated towards Mukden. At the close of a five-days' battle in October, the Russians again retreated. After a number of attempts to capture Port Arthur by storm, the Japanese through trench warfare compelled the city to surrender January 2, 1905.

Other Engagements. There were no important engagements about Mukden until February 20, 1905, when the Japanese advance began. The series of engagements known as the Battle of Mukden constituted the greatest land battle of history previous to the World War. Over 700,000 men were

engaged, and the line of battle extended over eighty miles. The Japanese were reinforced by troops from Port Arthur under General Nogi, and were finally victorious. The naval battle in the Sea of Japan, May 27 and 28, resulted in the destruction of the Russian fleet.

Treaty of Peace. In June, 1905, President Roosevelt, voicing the sentiment of almost all nations, suggested to the combatants the advisability of ending the struggle, and in August of that year the peace convention met at Portsmouth, New Hampshire. The treaty, which was signed on September 5, gave Port Arthur to Japan, made it supreme in Korea, allowed it important railway privileges in Manchuria and ceded to it the southern half of Sakhalin Island. One of the most important results of the war for Japan was the raising of that nation to a first-class power.



THE RUSSO-JAPANESE WAR
Showing battles and rearrangement of boundaries.

RUSSO-TURKISH WAR, the war between Russia and Turkey in 1877 and 1878. For some years Russia had been looking for an opportunity to retake the territory lost in the Crimean War, and the massacre of Christians in Bulgaria in 1876 offered a pretext for again making war on Turkey. Russia declared itself the defender of the Christians in the Balkan provinces, and began the war in 1877. The rout of the Turks at Philippopolis and the capture of Plevna were the only important engagements. Russia resorted to modern methods of warfare, and in a few months wore the Turks out. The war was ended by the treaty of San Stefano, which was very favorable to Russia. However, the other great powers, England, France and Germany, felt that the treaty gave Russia more power than could safely be given that country, and the Congress of Berlin was called to modify the terms of the treaty. See BERLIN, CONGRESS OF.

RUST, the brownish-red substance that forms on the surface of iron and steel when they are exposed to damp air, or to the action of air and water. When the name is used without any explanation it means *iron rust*. It is an oxide of iron. Rust may be removed from iron or steel by polishing with emery or some other powder. If a deep coat is formed, however, a file, a grindstone or an

emery wheel may be necessary. Yellow spots formed on linen by iron rust may be removed by soaking the fabric in a weak solution of oxalic acid and then washing it, though a strong solution of this acid is likely to weaken or destroy the fabric. Sometimes lemon juice will remove the spots.

RUSTS, minute fungi that attack the leaves and stems of certain plants and cause extensive damage to wheat and some other crops. These fungi take their name from the resemblance of the disease they produce to iron rust.

Rust may be said to begin with little black dots and lines that appear on the surface of the stem late in summer. These lines are the innumerable spores which constitute the form in which the plant survives the winter, or its rest period. In spring each spore begins to grow, but after a little, it will die, unless in some way it is carried to the barberry bush. Upon the leaves of that shrub the growing spores thrive lustily, and soon they grow to be long chains of little fringed cups, on the lower side of the leaves. These cups produce a different kind of spores, which are carried by the wind, or in some other way, to wheat or grass or some cereal, where they force their way into the pores of the leaves and mature the blight spores that spoil the fruit. A field infected with rust should not be planted to the same crop the second season. After the harvest the stubble and straw should be burned and the ground thoroughly plowed. A tillage crop, such as corn or potatoes, assures the destruction of the spores.

RUTH, Book of, a book of the Old Testament, between *Judges* and *Samuel.* It gives a beautiful picture of the domestic life and customs of the Israelites of that period. Ruth, the heroine, who gives the name to the book, by her marriage with Boaz, a wealthy landowner of Bethlehem, became the grandmother of David, and one of the ancestors of Jesus. The name of the writer and time of writing are unknown. For the detailed story of Ruth, see Bible, subhead *Bible Stories.*

RUTHE'NIANS, or **LITTLE RUS'SIANS,** the name applied to the Slavs inhabiting Southern Russia and Austria on both sides of the Carpathian Mountains. They number about 20,000,000, about one-fourth of whom are in Galicia. They are short of stature, and have brown hair and eyes. They speak the Russian language, and most of them belong to the United Greek Church. Agriculture is about their only occupation, and they employ methods and implements long since discarded by more progressive peoples. For the position of the Ruthenians at the close of the World War, see Galicia.

RUTILE, *roo'til,* a brownish-red mineral that forms hairlike crystals in transparent quartz. It also occurs in brown masses. Rutile is found in the largest quantities in Sweden, in the Ural Mountains, and in the United States. It is used for coloring glass and porcelain a yellow tint. Transparent quartz containing rutile forms attractive cabinet specimens. Some of the finest specimens are polished and set, making beautiful gems.

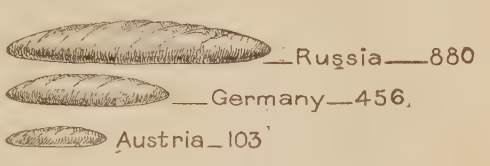
RUT'LAND, Vt., the county seat of Rutland County, fifty-six miles southeast of Montpelier, on the Otter Creek and on the Rutland, the Clarendon & Pittsford and the Delaware & Hudson railroads. The city is situated near lofty and picturesque peaks of the Green Mountains and in a region containing very extensive deposits of marble. Iron ore, fire clay and slate are also found, and the city has the largest scale works in the world, railroad shops, lumber mills, machine shops, boiler and engine works and other factories. The prominent buildings include Memorial Hall, a courthouse, a Federal building, public and Baxter libraries, the house of correction, a Knights of Pythias Home and a hospital. The place was settled about 1770. From 1784 to 1804 Rutland was one of the state capitals, and the state house, constructed in 1784, is the second oldest building in the state. During the Revolution two forts were erected here. The city was chartered in 1892. Population, 1910, 13,546; in 1917, 15,038 (Federal estimate).

RUTLEDGE, *rut'lej,* John (1739-1800), an American statesman and jurist of Revolutionary days, first governor of the state of South Carolina. He labored earnestly for the independence of the colonies, both in his native state and in Congress. He represented South Carolina in the Stamp Act Congress, and in the Constitutional Convention was a warm supporter of the Federal Constitution. Rutledge was appointed one of the first justices of the United States Supreme Court, but later resigned this position to become chief justice of the supreme court of South Carolina. In 1795 Washington appointed him Chief Justice of the United States Supreme Court, but Rutledge's mind giving way, the appointment was not confirmed.

RUYSDAEL, or **RUISDAEL**, *roys'dahl*, JACOB VAN (1625–1682), the foremost of Dutch landscape painters. He was born at Haarlem, and spent much of his life at Amsterdam, where, between 1660 and 1675, his best work was done. During his lifetime his work was not highly valued, and he died in an almshouse. Although he painted views of the sea and coasts, most of his subjects were quiet waysides and lovely forest glades. Unlike most landscape painters, his object was not to reproduce particular scenes, but to produce a beautiful composition made up of various elements gathered promiscuously; thus his canvases are a sort of idealization of nature. Among the fine examples of his work are *Landscape with Ruins* (National Gallery, London); *Storm at Sea* (Louvre); *Cottage Under Trees, Wheatfields* and *Forest Stream* (Metropolitan Museum, New York).

RY'AN, ABRAM JOSEPH (1839–1886), an American Roman Catholic priest and poet. Soon after his ordination Father Ryan became a chaplain in the Confederate army and served until the war closed. Afterwards he edited *The Star* and *The Banner of the South*, both Roman Catholic weeklies. Subsequently he was in charge of a parish in Mobile, Ala., where he remained until 1880. His best known poems are *The Conquered Banner*, written at the close of the Civil War, *The Lost Cause*, and *The Flag of Erin*.

RYE, a grain closely related to wheat and barley. It originated in Siberia, and is raised farther north than any other grain. For centuries rye has been one of the most important food plants. It has been cultivated in Asia and Europe since time immemorial. It thrives in climates and in soils which forbid wheat, requires less manure and ripens faster. It is extensively grown in northern Europe, and rye bread forms an important article of food for the laboring classes of many parts of Russia, Sweden, Norway, Denmark, Holland, and Prussia. Unmalted rye meal, mixed with barley malt and fermented, forms the mash whence is distilled the spirit known as Holland gin (See GIN). The straw is long and flexible, does not rot easily and is used by brickmakers and thatchers, also for stuffing horse collars and mattresses and for making baskets, straw hats, and bonnets. A fungus



PRINCIPAL PRODUCING NATIONS

sometimes grows on rye, causing the disease known as ergot, which makes rye so infected dangerous for food. See ERGOT.

A good crop of rye yields from twenty to thirty bushels of grain per acre. Before its revolution, Russia was the greatest rye-producing country in the world. The average annual production of this grain in the United States is about 44,000,000 bushels, with a yield approximately of sixteen bushels per acre.

RYE HOUSE PLOT, a conspiracy planned by some of the most radical of the English Whigs in 1683 to assassinate Charles II, on his return from the races at Newmarket. The plot was to have been executed at Rye House, a farm on the road to London, and from this fact the plot derived its name. Charles left Newmarket several days before he was expected to, and the plot failed. The conspiracy was afterwards detected, and Lord William Russell and Algernon Sidney were beheaded, though their connection with the plot was not proven. The Earl of Essex, another of the conspirators, committed suicide in the Tower of London.

RYSWICK, *riz'wik*, TREATY OF, a treaty negotiated between France and Great Britain on one side and Spain and Holland on the other, Sept. 20, 1697. This treaty ended the nine years' war between Louis XIV and the Grand Alliance and restored to the respective countries all conquests made in America and the East Indies during the war. The village of Ryswick is near The Hague.

S, the nineteenth letter of the English alphabet. The corresponding letter of the Phoenician alphabet had somewhat the form of a *w*, which in Greek was turned on edge, gradually becoming rounded into its present form. *S* has a twofold pronunciation—the sharp, or sibilant, character, as in *sack, sin, this, thus;* and the soft or sonant, *z* sound, as in *muse, flies.* In certain words, as *fissure, sugar, passion,* it has the sound of *sh.*

SABBATH, *sab'ath,* the Hebrews' divinely appointed day of rest and worship. The origin of the Sabbath is given in the Bible in the second chapter of Genesis:

> "And on the seventh day God ended his work which He had made; and He rested on the seventh day from all His work which He had made. And God blessed the seventh day and sanctified it."

In the Ten Commandments the Israelites are expressly commanded to observe the Sabbath, in the words: "Thou shalt observe the Sabbath day to keep it holy." For centuries this commandment was obeyed to the letter. No work was allowed, and one could not travel farther than a Sabbath-day's journey, a little less than a mile, from the city. The Pharisees added many trivial rites and ceremonies to Sabbath observance, and at the coming of Christ they placed greater emphasis on the letter than the spirit of the law. Christ taught that it was lawful to do good on the Sabbath, and that the Sabbath was made for man, and not man for the Sabbath.

As every seventh day among the Jews was a day of rest for man, so every seventh year was a year of rest for the land, and was known as the *Sabbatical year* of release for Jewish debtors.

Sunday. Saturday is the Sabbath of the Jews and a few minor Christian sects, but the Christian Church in general observes Sunday, or the first day of the week, as a day sacred to rest and worship. There is no reference to the Sabbath in the New Testament, except in the Gospels, but there are numerous references to the first day of the week. Since this was the day on which Christ rose from the dead the Christians adopted it as their Sabbath, and its observance as a day or rest and worship, or as the Lord's Day, has become general.

SABINE, *sa been',* a river rising in the northeastern part of Texas and flowing southeastward, then southward to the Gulf of Mexico through Sabine Lake and Sabine Pass. It is about 500 miles in length, and for about 300 miles forms the boundary between Texas and Louisiana. It is navigable only by small steamers.

SABINES, *sa beenz',* an ancient Italian people, allied to the Latins, and an important nation before the foundation of Rome. They were a brave, religious race, confined to the mountain districts to the northeast of Rome. According to legend, the daughters of the Sabines were seized and carried off by the early Roman youths for wives while they were being feted at a great festival. When the Sabines were dissuaded by the Romans from waging war upon them, the two nations united in 290 B. C., the Sabines settling on Quirinal Hill. See ROME, HISTORY OF.

SABLE, a small fur-bearing animal, a native of Siberia. It is akin to the American sable and the pine marten. It averages a foot and a half in length, and has a bushy tail and glossy brown fur. The animal makes its home in rock crevices and in trees, and is very wary and difficult to capture. Nuts and such small animals as squirrels, birds and mice constitute its food. Sable fur is one of the most valuable of all commercial furs, a single small pelt sometimes bringing $200. A coat made of sable of fine quality is worth several thousand dollars.

SABLE ISLAND, the "graveyard of the Atlantic," known to early navigators as Santa Cruz, or "Holy Cross," is a low, crescent-shaped sandy island, twenty miles long, southeast of Nova Scotia, to which it belongs. The Canadian government has planted thousands

SABLE

of trees here to stabilize its shifting sands. As the island is surrounded by shoals and sandbanks, constant vigilance is maintained by its lighthouse, life-saving, and wireless telegraph stations. Navigation is dangerous in the vicinity owing to storms, icebergs and a generally rough sea.

SABOTAGE, *sab o tahzh'*, a French term derived from sabot, meaning a *wooden shoe*, or *to cut shoes*. Since 1887 the meaning has been extended by certain labor organizations to apply to damaging or destroying the property of an employer by workmen, who take this means instead of strikes for securing their demands. Sabotage takes various forms. Among the most common are damaging machinery by putting sand in the bearings; cutting logs shorter than the required length and sawing boards thinner than the required dimensions; mislaying tools, and thus causing delay; using poorly prepared material in building; working so slowly and accomplishing so little that the employer suffers loss—in short, doing anything in secret that will annoy the employer and reduce his profits. In nearly all cases it is very difficult to detect the malefactors.

Sabotage is repudiated by all reputable labor organizations, but it is upheld by the Syndicalists in Europe and by the Industrial Workers of the World in America. See SYNDICALISM; INDUSTRIAL WORKERS OF THE WORLD.

SAC, or **SAUK**, a tribe of the Algonquian family of Indians, whom the French explorers found in Northern Wisconsin in the latter part of the seventeenth century. They, with their kindred, the Foxes, were gradually driven south by the Ojibwa, and the two tribes formed a confederation. Both the Sacs and Foxes were noted for their hostility to the whites. Black Hawk, one of their chiefs, was one of the most famous Indians in history. Both tribes were driven westward and nearly exterminated, though a few still live in Kansas and Oklahoma. See BLACK HAWK.

SACCHARIN, *sak'a rin*, a white powder five hundred times sweeter than cane sugar. It was made known to the world in 1879 by Dr. Constantin Fahlberg of Germany and Prof. Ira Remsen, a noted American chemist. Although the sweetening power of saccharin is much greater than that of sugar, it does not contain as much nourishment. It is not fermentable and is used in the treatment of certain diseases, such as diabetes, and in many cases in which the palate craves for sweets, but in which ordinary sugar cannot, without danger, be permitted. Saccharin is extensively used in the manufacture of confectionery and cordials, in baking and in preserving fruit. It is usually sold in tablets.

SACHS, *zahks*, HANS (1494–1576), Germany's most distinguished sixteenth-century meistersinger and poet, born at Nuremberg. He learned the trade of a shoemaker, and after four years' wandering throughout Germany as journeyman to his trade, he returned to his native city, where he remained until his death. He was most prolific, having written almost 7,000 meistersongs, dramas, narratives, fables, and hymns, one-fourth of which are in print. Sachs succeeded in imparting to his hymns a spiritual feeling which considerably aided the spread of the Reformation.

SACRAMENT, *sak'ra ment*, in the Christian Church, the observance of a solemn rite for the purpose of bringing the worshiper into closer communion with God. The sacraments universally observed by the Christian Church are baptism and the Lord's Supper. To these the Roman Catholic and Greek churches add confirmation, the eucharist, penance, extreme unction, holy orders and matrimony. Quakers reject all sacrifices as unnecessary formalities. Most

Protestant Churches claim that sacraments are a solemn covenant between God and the soul, but that in themselves they are not means of grace.

SACRAMENTO, *sak ra men'toh*, CALIF., the capital of the state and the county seat of Sacramento County, is situated on the Sacramento and American rivers, ninety miles northeast of San Francisco. It is served by the Southern Pacific and the Western Pacific railways, and by an extensive system of electric interurban lines. The city occupies a low plain bordering on the river, and is surrounded by a fertile and beautiful country. The streets are broad and lined with shade trees.

The state capitol, completed in 1869 at an expense of $2,500,000, is the most prominent structure in the city. It stands in the center of a park of thirty-four acres, beautifully laid out in walks, lawns and flower beds, interspersed by many rare and beautiful trees. Additional buildings to cost $3,000,000 are to be erected for state use. Other public buildings of note include a Federal building, a city hall, a courthouse, the Crocker Art Gallery, a Y. M. C. A. building, the Trust Exchange, the Foresters', Masonic, Elks' and Odd Fellows' buildings, the Forum, the Sutter and Women's Clubs and the Sacramento and Travelers' hotels.

Sacramento has several parks, whose combined area exceeds 1,000 acres. These include Capitol Park, McKinley Park, South Side, Del Paso and a number of smaller areas. The grounds of the State Agricultural Society adjoin the city, and the annual state fair is held there. Among the educational institutions are the State Library, one of the largest on the Pacific coast, the Public Library, the Odd Fellows' Library, the Christian Brothers' College, Howe's Academy and Saint Joseph's Academy. The leading benevolent institutions are the Marguerite Home, the Protestant Orphan Asylum, the County Hospital and the hospital of the Southern Pacific Railway.

Sacramento is in one of the most fertile agricultural regions of the state, and it is the distributing point for large quantities of fruits and agricultural produce. Some of the largest industrial plants are connected with the handling of fruit. The manufactories include flour and grist mills, canneries, foundries and machine shops, meat-packing establishments, and manufactories of carriages, harness and saddles, furniture, soap and other commodities. The repair shops of the Western Pacific and the Southern Pacific railways are located here, the latter employing about 3,500 men.

The first settlement was made by Captain John A. Sutter in 1839. Two years later Captain Sutter built a fort and named the place New Helvetia. In 1848 the name was changed to Sacramento and the first lots for the town were sold. During the early fifties Sacramento was an important distributing point for the gold mines in the surrounding country and was connected by stage with Stockton, Maryville and several other places. It became the capital in 1854, and two years later the first railroad reached the city. During its early days the city suffered several times from floods, but later the low land was raised and the city was protected by dikes. Several disastrous fires have also occurred. However, the city has recovered from each of these disasters and has continued to grow and to increase in commercial importance. Population, 1910, 44,696; in 1917, 68,984 (Federal estimate).

SACRAMENTO RIVER, the largest river in California, has its source on the western slope of Mount Shasta and flows south into Suisun Bay. It is 600 miles long, and is navigable for 300 miles for small boats, and to Sacramento, the only large town on its banks, for larger vessels. Its chief tributaries are the Pitt and the San Joaquin. The Pitt is sometimes called the Upper Sacramento. The Sacramento flows through a fertile region and waters a beautiful and fruitful valley.

SACRED COLLEGE, or COLLEGE OF CARDINALS, the entire body of cardinals in the Roman Catholic Church. The cardinals are appointed by the Pope, and they assist him in managing the affairs of the Church. At present there are seventy, but the number has varied from time to time. The Sacred College is a corporate body, with an income of its own. Its most solemn duty is, upon the death of the Pope, to elect his successor. During the election the members are excluded from intercourse with the public. See CARDINAL; POPE; ROMAN CATHOLIC CHURCH.

SACRIFICES, *sak'ri fi ses*, gifts offered to a god in thanksgiving, for the purpose of communion or to secure atonement for sin. The idea underlying sacrifices is that worship

should consist in something more than words, the giving of something dear to the worshiper. Among the ancients sacrifices were often offered to counteract the wicked disposition of a god or to turn aside his wrath.

The sacrifices offered by the Jews are the most noteworthy. They were of two types—the bloody, and those without blood—that is, animal sacrifices and sacrifices of the fruits of the land. The animal offerings included the *burnt offering,* a lamb, male, without blemish, offered twice daily for the people, in the name of the nation; the *peace offering,* a lamb or goat, male or female, without blemish, offered by families at new moons, or on special occasions of thanksgiving; and the *guilt offering* made by individuals for cleansing from sin, and, once a year by the High Priest, on Atonement Day, for the sins of the nation. Details of the sacrifices are found in the book of *Leviticus.* Few religions, whether ancient or modern, have omitted sacrifices from among their rites. The ancestors of all the existing races in Europe practiced human sacrifices, and similar usages widely prevailed throughout the world.

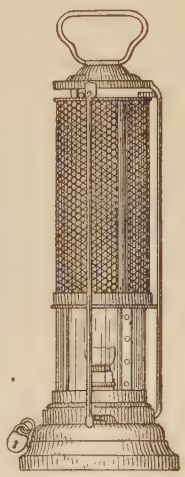
SADDLE, a seat placed on a horse's back for the rider. In early ages, the rider sat on the bare back of his horse, but in course of time some kind of covering was placed over the back of the animal. Such coverings became afterward more costly and were sometimes richly decorated. The modern riding saddle consists of the tree, generally of beech, the seat, the skirts and the flaps, of tanned pig's skin. The construction and weight vary according to the purposes for which it is to be used. Among the varieties are racing saddles, military saddles, hunting saddles, and side-saddles, for ladies.

SADDUCEES, *sad'u seez,* one of the two chief sects or parties among the Jews at the time of Christ. The sect had its origin among the aristocracy, and most of the high offices were held by its members. The high priests Annas and Caiphas were Sadducees. Josephus, the Jewish historian, said of them: "They had only the rich on their side, but not the common people." A constant feud existed between the Pharisees and Sadducees. The latter adhered to the Law of Moses, but rejected the oral law; they denied the resurrection of the dead, and did not believe in angels and spirits. After the destruction of Jerusalem by Titus, the Sadducees disappeared. See PHARISEES.

SADOWA, *sah'doh vah,* BATTLE OF (also known as the Battle of Königgrätz), a battle fought July 3, 1866, between the Austrians and the Prussians in the village of Sadowa, in Bohemia, the Austrians suffering defeat. It was the decisive engagement of the Seven Weeks' War, and as a result Prussia became the leading state of the North German Confederation and ultimately of the German Empire. See SEVEN WEEKS' WAR.

SAFE, a steel box, used to protect valuables from fire and burglars. Safes have double walls of steel, with a space between, usually six or eight inches wide, filled with some substance which does not readily conduct heat. Most compositions used for this purpose contain clay, gypsum and alum, or some similar substance. Sometimes the space contains bottles filled with water. In case of fire the water forms steam, which protects the inner wall from heat. The outside casing of a safe is made of very hard steel, and the plates and doors are fitted with the greatest care, so as not to admit even of the finest pointed tool to the joints. The door is fastened by a combination lock, which is manipulated by the turning of a handle. When the door is locked and the combination is manipulated, the door cannot be opened until the necessary number of turns have been given to the indicator. Safes used in banks usually have the time for opening regulated by a clock, and are considered more nearly proof against burglars than safes without this device. The modern vault is a large safe built up of alternate layers of steel plates.

SAFETY LAMP, a lamp for lighting coal mines without exposing the miners to the explosion of a gas called *fire damp.* The first safety lamp was invented by Sir Humphry Davy in 1816, and until quite recently his pattern, with some slight modifications, was in general use. It consists of an ordinary oil lamp, surrounded by a cylinder of wire gauze of fine mesh, which is locked over the lamp after it is lighted. The heat of the flame will not pass through this


SAFETY LAMP

gauze screen and ignite the gas outside until the gauze has become as hot as the flame, and it will not become so heated before the miner has time to withdraw from the chamber. The presence of fire damp can be detected by lowering the wick, when a pale blue flame will be noticed above the flame of the lamp if the gas is present. A prudent miner, observing this warning, will immediately withdraw from the locality. There are several patterns of safety lamps in use, but they all depend upon the principle of Davy's lamp. See FIRE DAMP.

SAFETY VALVE, an appliance attached to steam boilers to regulate the pressure of steam. The safety valve consists of a steel or iron stopper that fits an opening in the boiler somewhat as a cork fits the mouth of a bottle. The valve is held tightly in place by weights attached to a lever or by a spring. In either case the valve is gauged to open at a pressure several pounds below what the boiler is estimated to carry with safety. When the steam reaches the pressure at which the valve is gauged, it opens and some of the steam escapes; the pressure therefore cannot increase above this point. Boilers of locomotives and steamships carry safety valves regulated by a spring, but those on most stationary boilers are gauged by weights. Weights are preferred by engineers because their pressure is constant, while the pressure of springs may vary. See BOILER.

SAFFLOWER, *saf'lou er,* a large, thistle-like plant, with orange-red flowers, cultivated in China, India, Egypt and Southern Europe. Its modern use as a dyestuff has largely been replaced by aniline dyes, and it is now most generally employed in the preparation of rouge and to adulterate saffron. In India an oil for fuel and cooking purposes is pressed from the seeds.

SAF'FRON, *saf'run,* a low, bulbous plant, with grasslike leaves and large, crocuslike purple flowers, cultivated in the East and in Southern Europe for the sake of its stigmas. These, when dried, form the saffron of commerce, which has a deep orange color, a warm, bitterish taste and a sweetish, penetrating odor. As it takes the stigmas of more than four thousand flowers to yield an ounce of saffron, it has always been very expensive. Its orange-red extract is used by painters and dyers, but this is now generally displaced by cheaper coloring matters. Saffron itself is employed in cookery and confectionery as a coloring and flavoring substance. It is no longer regarded as a drug and is of little value for medicinal purposes among the most advanced physicians.

SAGAS, *sah'gaz,* or *sa'gaz* (tales), the name given among the Icelanders to a class of prose epics—historical, mythical or romantic in context—tracing in detail events in the lives of Icelandic heroes and rulers. Originally they were composed for oral recitation on festive occasions, and before the twelfth century were preserved only in the memories of the people, which accounts for the varying versions of the same events. Between the twelfth and fifteenth centuries many of these detached tales were collected, amplified or curtailed, and worked into a series of consecutive narratives.

The sagas of the west of the island are the more elegant in style, probably because of Celtic influence. Among the more important sagas are the *Saga of Gisli,* the outlaw; that of the hero and poet Egill; the *Laxdoela Saga,* the story of the Icelandic heroine Gudrun; the *Saga of Grettir the Strong,* and the *Saga of Nial,* a complex saga of great legal and historical value. A number of the most interesting sagas are to be had in English translations, but their authorship in many instances is unknown.

SAGE, *sayj,* a perennial garden herb, cultivated for its leaves and stems, which contain an essential oil, valuable as flavoring. It grows in temperate and warm regions, in dry soil, and may be propagated by slips or cuttings. In some sections of the United States a tea made from sage leaves is drunk as a tonic and as an aid to digestion. The plant has a much wider use as a flavoring. The best known species, the common *garden sage,* is a little shrubby plant, with rough, grayish leaves and small bluish flowers. *Meadow sage* is common in meadows of both Europe and America.

SAGE, RUSSELL (1816–1906), an American financier, born at Shenandoah, N. Y. He was reared on a farm, received a public-school education and in his young manhood held various minor political offices. From 1853 to 1859 he was a Whig member of Congress, and soon afterwards he moved to New York and became associated with Jay Gould in railroad operations. He left his entire fortune of $50,000,000 to his wife, Margaret Olivia Slocum Sage, to be used by her without restriction.

Margaret Olivia Slocum Sage (1828–1918), wife of Russell Sage and one of the foremost of American philanthropists. She was born at Syracuse, N. Y., and educated at Troy Female Seminary. In 1907 she established, the Russell Sage Foundation, "for the improvement of social and living conditions in the United States," and endowed it with a fund of $10,000,000. Out of this fund model apartments have been erected in New York to replace tenements, and much reform work along social and educational lines has been financed; a model community has been established on Long Island and an island has been purchased in the Gulf of Mexico for the protection of birds. At her death Mrs. Sage left practically all of her estate to the furtherance of philanthropy and education. See RUSSELL SAGE FOUNDATION.

SAGEBRUSH, the name of a group of dry shrubby plants, belonging to the composite family. Sagebrush is the characteristic vegetation of the arid and desert regions in the western part of the United States, and in some localities it forms the only vegetation found on large areas. There are several varieties, known as *black sage, white sage* and *silvery sage,* but all bear the same general characteristics. The plants grow from six to twelve feet high, and have a straight, stiff stem bearing a profusion of small wedge-shaped leaves and clusters of small flowers at the top of the branches.

Nevada is popularly known as the *Sagebrush State,* because of the large portions of the state covered with this plant.

SAGE GROUSE, the largest of American grouse, yet found on the sagebrush plains of Western North America and in mountain valleys. When fully grown it is about two and one-half feet in length. On each side of the neck of the male is an inflatable sack, like that of the prairie chicken (see GROUSE). The flesh of the sage grouse is usually tainted by its food, which renders the taste unpleasant.

SAGHALIEN. See SAKHALIN.

SAG'INAW, MICH., third city in size in the state and the county seat of Saginaw County, sixty-five miles northeast of Lansing and 100 miles northwest of Detroit, on the Saginaw River, at the head of deep-water navigation, eighteen miles from Saginaw Bay, and on the Grand Trunk, the Pere Marquette and the Michigan Central railroads. The educational institutions include Germania Institute, a free manual training school, a trade school, and the Hoyt and the public libraries, a natatorium and an auditorium. The city contains the Saginaw, Saint Mary's, Women's and the detention hospitals, a home for the friendless and Saint Vincent's Orphanage. Some of the other prominent buildings are the courthouse, the postoffice, the city hall, the Masonic Temple, Y. M. C. A. and Y. W. C. A. and an Elks' Temple.

Saginaw was formerly one of the greatest lumber-manufacturing centers in the country, and it still has a very extensive lumbering industry. The future of the city depends chiefly upon the extensive coal fields and upon the rich agricultural country, which is especially productive of sugar beets. There are also valuable salt deposits in the vicinity. The city contains beet-sugar mills, glass works, iron, steel and wood-working factories, furniture, steering gears, silos, flour mills and a large number of wholesale houses. The town was laid out in 1836, and was incorporated in 1851. Saginaw was created in 1890 by the consolidation of Saginaw City and East Saginaw, which are on opposite sides of the river. The city adopted the commission form of government in 1914. Population, 1910, 50,510; in 1917, 56,469 (Federal estimate).

SAGITTARIUS, *saj i ta'ri us* (the archer), a southern constellation or sign of the Zodiac, represented by the Archer's arrow and part of the bow (♐). The sun in its revolution enters the sign of Sagittarius about November 22.

SA'GO, a food-starch obtained from the trunk of several species of palms which grow in the East Indies. The palm from which

SAGO PALM

the finest sago is prepared forms immense forests on nearly all the Moluccas, each stem

yielding from about 100 to 800 pounds of sago. The tree is about thirty feet high and from eighteen to twenty-two inches in diameter.

The trees devoted to the production of sago are not permitted to come to full maturity, as the ripening of the fruit saps the starchy center, leaving the trunk a hollow shell, which kills the tree. After cutting down, the woody parts of the tree are separated by washing, and the meal is dried.

For exportation the finest sago meal is mixed with water and then rubbed into small grains of about the size and form of coriander seeds. The Malays have a process for refining sago which also gives it a fine pearly luster, this method being unknown to Europeans; but there are reasons to believe that heat is employed, as the starch is partially transformed into gum. Sago forms a light, wholesome, nutritious food, and it is also used largely in the manufacture of soluble cocoas and for adulterating the common varieties of arrowroot. See STARCH.

SAGUENAY, *sag eh na',* **RIVER,** a river of the province of Quebec and one of the largest tributaries of the Saint Lawrence, has its source in a number of streams flowing into Lake Saint John, from which the Saguenay issues. The river has a length of 110 miles, flows in an easterly direction, and enters the Saint Lawrence 120 miles northeast of Quebec. There are numerous rapids and cascades in the first forty miles of its course, but from Chicoutimi it is navigable for small steamers, and from Ha Ha Bay, sixty miles above its mouth, for large steamers. In its lower course the Saguenay is from three-fourths of a mile to two miles wide, and from 800 to 2,000 feet deep. From Ha Ha Bay to the Saint Lawrence it flows through an unbroken chasm of rock with nearly vertical walls, which vary in height from 300 to 1,800 feet. The river is famous for the grandeur of its scenery. Tadusac, at its mouth, and Ha Ha Bay are summer resorts.

SAHARA, *sa hah'ra,* the largest desert on the earth's surface, occupying the greater part of Northern Africa. It extends, roughly, from the Atlantic Ocean, on the west, to the Nile basin, on the east, and from the Sudan, on the south to the Atlas Mountains and, in places, to the Mediterranean sea, on the north. The arid region east of the Nile is a part of the desert. The entire area of the Sahara is more than 3,500,000 square miles—almost as extensive as the mainland of Europe and quite equal in extent to the Dominion of Canada.

Its Surface. The Sahara is not, as many suppose, a vast, flat expanse of burning sand. On the contrary, the surface presents considerable variety. As a whole, this desert is a table-land, in elevation from 1,300 to 1,600 feet above the sea. In limited areas it drops to 500 feet, and there are a few depressions below sea level. The great central plateau, from 1,000 to 2,500 feet high, extends in a northeast—southwest direction three-fourths of the desert's length. It is crossed by three mountain ranges, the Tibesti, the Air and the Ahaggar, which rise to heights ranging from 6,000 to 9,000 feet. In winter they are snow-capped. The western part of the desert is chiefly rock-strewn plains, and the northern and eastern parts, the latter known as the Libyan Desert, are a vast expanse of sandy waste. Here are vast areas of glistening sand which is swept into fantastic and sometimes beautiful shapes by frequent strong winds—great hollows like the craters of volcanoes, gigantic drifts from 300 to 400 feet high, that rise like petrified waves above the surrounding levels. On these trackless wastes of shifting sand there is no animal or vegetable life except in the few oases.

Caravan Routes. The oases occur wherever water from underground natural reservoirs comes to the surface in the form of a spring and gives rise to vegetation. Here date palms grow luxuriantly—for the soil of the desert is everywhere fertile and needs only water to make it productive. Where the supply of water is sufficient to support a settlement, villages have sprung up, wheat, millet and barley are cultivated, and vegetables and fruits are grown; cotton also is raised, this being the chief fiber for weaving. Except for the oases, travel across the desert would be impossible, and the trade between the Sudan and the Barbary States would be almost entirely cut off. As it is, there are numerous well-marked caravan routes across, leading from Timbuktu and other cities of the Niger and from settlements on Lake Chad, to the Mediterranean ports. The desert has one important natural resource—salt, vast deposits of which occur in the southern part.

Climate. The Sahara has two seasons—winter, four months long, and summer, eight months in duration. In the central mountains

there is considerable rainfall, but the water, instead of running off in rivers, flows a short distance and then sinks into the sand. The climate of the north varies somewhat from that of the south. In the hot season the temperature rises to 120 degrees. The temperature falls sometimes forty degrees after nightfall. On the plateau water sometimes freezes at night, even after a very hot day. The entire desert is much visited by storms, which because of the quantities of sand they lift into the atmosphere are very dangerous. Sometimes these storms are so severe they cause the suffocation of travelers and camels.

Life in the Desert. Wild animals are rare in the Sahara. About the oases and on the outskirts there are lions, panthers, wolves, foxes, hyenas and jackals. Lizards and venomous serpents are numerous, and in the interior are found the jerboas, or jumping mice. The desert is the natural home of the camel, and this is the chief domestic animal, although a few donkeys, horses, goats, sheep and cattle are raised.

The Sahara is inhabited by a mixed people. In the west are the Berbers, or desert Moors; in the central region are the Tuaregs, who prey upon caravans; in the east are negroes and Bedouins.

SAIGON, *si gohn′,* COCHIN-CHINA, the capital of the French colony of Cochin-China and one of the finest cities in Asia, is situated on the Saigon River, thirty-five miles from its mouth. It is connected with Mekong by canal and with Mytho by rail. The river is navigable at high tide, and the city has a navy yard, a dry dock and repair docks, besides extensive wharves. It consists of two parts, the commercial town and the native town. It is regularly built and has good modern buildings, surrounded by gardens, as well as pleasant promenades. The chief structures are the citadel, the government palace, the arsenal, the astronomical observatory and the buildings of a number of colleges. The city also maintains botanical and zoölogical gardens. The trade is large and is carried on with the Dutch East Indies, the Philippines and with numerous ports of Asia and Europe. It is also an important center of rice manufacture. Population, 1913, estimated 72,000.

SAILBOAT AND SAILING. A small row boat can be converted into a sailboat by having a mast raised and a sail attached to it, but such a boat will not sail in a satisfactory manner because it has no center board or keel to prevent it from drifting with the wind. To overcome this difficulty a board, called the *lee board,* is hung to the lee side of the boat, that is, the side away from the wind. This will, in a measure, take the place of a center board. The mast should be of pine or spruce, ten feet long and about three inches in diameter at the base and a little smaller at the top. To put or "step" the mast, cut a hole the diameter of the mast in the center of the forward seat, and directly beneath this nail a block in which the base of the mast may rest. The hole in the block need not be more than two inches in diameter. Cut the mast down to fit it. This support will be strong enough for the mast of a small boat. Attach a boom of the mast so that it will readily slide up and down. The boom should be about twelve feet long and much smaller and lighter than the mast. Unbleached cotton sheeting is the best and least expensive material for a sail. The sail may measure eleven feet at the bottom and should be nine feet high. It should be hemmed on all sides and fastened to the mast by rings, so it will readily slide up and down. It is raised and lowered by means of a cord passing over a pulley at the mast head. An oar can be used for a rudder.

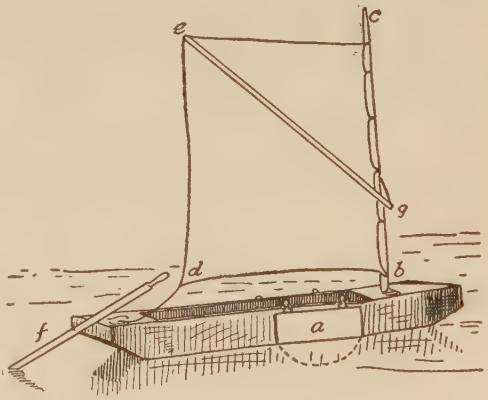


FIG. 1.
a, lee board; bc, mast; d, loop in sail; eg, sprit; f, oar used as a rudder.

There is little difficulty in sailing a boat directly before the wind, but in most cases the navigator wants to sail in a direction different from that in which the wind is blowing, and he must learn to manage his sail and rudder, that he may sail his boat to the desired haven. A flat-bottomed boat or punt

(Fig. 1) is the safest for a beginner. (See page 482).

In Fig. 2 the wind is blowing in the direction of the arrow. The boat at A desires to sail to B. Obviously it cannot sail directly

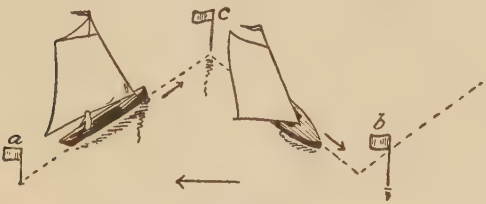
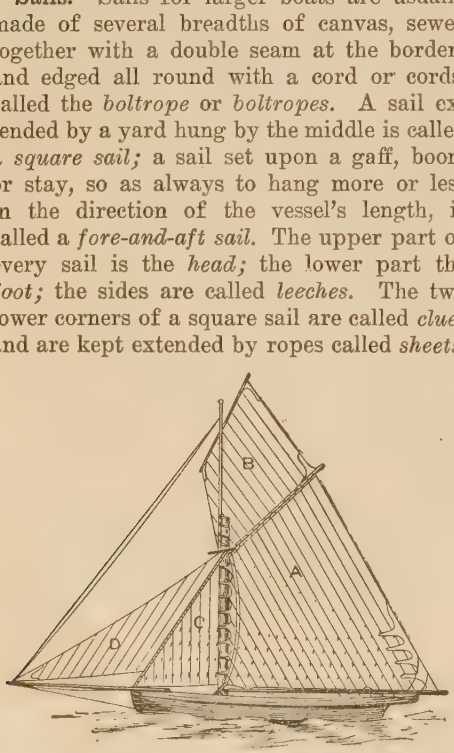


FIG. 2.

against the wind, and it must, therefore, take a zigzag course, or *tack*. When the sail is placed in the position seen at A, the boat is driven towards the stake C. When it reaches C the navigator turns into the wind and shifts the sail to the position shown at right, and is driven towards B, the point it is to reach.

Sails. Sails for larger boats are usually made of several breadths of canvas, sewed together with a double seam at the borders and edged all round with a cord or cords, called the *boltrope* or *boltropes*. A sail extended by a yard hung by the middle is called a *square sail;* a sail set upon a gaff, boom or stay, so as always to hang more or less in the direction of the vessel's length, is called a *fore-and-aft sail*. The upper part of every sail is the *head;* the lower part the *foot;* the sides are called *leeches*. The two lower corners of a square sail are called *clues* and are kept extended by ropes called *sheets*.



SAILS OF A CUTTER YACHT

Sails generally take their names, partly at least, from the mast, yard or stay upon which they are stretched; thus, the main course, or mainsail, the main topsail, the main topgallant sail, are, respectively, the sails on the mainmast, the main topmast, and the main topgallant mast. In the accompanying diagram of the sails of a cutter yacht, *A* represents the mainsail; *B*, the gaff topsail; *C*, the foresail, and *D*, the jib.

SAINT AUGUSTINE, *aw'gus teen,* FLA., the county seat of Saint John County, on San Sebastian River and Matanzas Sound, thirty-six miles southeast of Jacksonville, and on the Florida East Coast Railroad. The town occupies a low site, only a few feet above the level of the sea, is an important winter resort and contains many large hotels. There are also numerous gardens containing subtropical plants, and oranges and other subtropical fruits are grown in the surrounding country. There are railroad shops and cigar factories. The remains of Fort San Marco, or Fort Marion, begun in 1656, are still in existence. There are also ruins of an old wall and city gate built by the Spaniards in the sixteenth century. Saint Augustine was settled by the Spaniards in 1565, and is the oldest town in the United States. The commission form of government was adopted in 1915. Population, 1910, 5,494; in 1917, about 6,000.

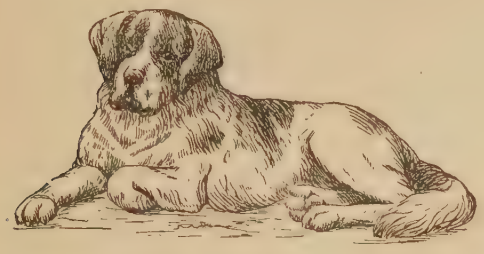
SAINT BARTHOL'OMEW, MASSACRE OF. See BARTHOLOMEW'S DAY, SAINT.

SAINT BERNARD, *sahN bur nahr',* GREAT, a celebrated Alpine pass in Switzerland, canton of Valais, on the mountain road leading from Martigny, in Switzerland, to Aosta, in Piedmont. The altitude is 8,150 feet at the highest point. Almost on the very crest of the pass is a famous hospice, next to Etna observatory the highest inhabited spot in Europe. The hospice was founded in 962 by Saint Bernard of Menthon. It is the mission of the resident monks, with the aid of Saint Bernard dogs, to rescue travelers who are lost in the snows on the mountains. The pass was much used by the Romans. In May, 1800, Napoleon led an army of 30,000 men, with artillery and cavalry, into Italy by this pass.

Little Saint Bernard, a mountain in Italy, belonging to the Graian Alps, about ten miles south of Mont Blanc. The pass across it, one of the easiest in the Alps, is supposed to be that which Hannibal used. It is 7,170 feet above the sea.

SAINT BERNARD, *bur'nahrd,* **DOGS,** a breed of large dogs named for the hospice of Saint Bernard in the Alps (see above), because the monks of this hospice train the

dogs to rescue travelers overcome by the snowstorms in the mountains. The dogs carry a bottle of brandy tied around their necks, and their sense of smell is so keen that



SAINT BERNARD DOG

they can detect a body buried several feet under the snow. When a traveler is found the dog calls for assistance by barking.

There are two varieties, the smooth-coated and the shaggy coated. The coat is usually white, with patches of black or brown. The standard breed has a tall, strong, erect figure, large head and intelligent expression. The Saint Bernard is the largest of domestic dogs; the best specimens are nearly three feet high and weigh 150 pounds.

SAINT BONIFACE, Man., on the Red River, opposite Winnipeg, with which it is connected by four bridges. The Canadian Northern, Canadian Pacific, Grand Trunk Pacific, Great Northern and an electric railway serve the city. The surrounding country is an agricultural section and sends great quantities of wheat to the mills of Saint Boniface. Besides flour, meat and meat products, lumber, linseed oil and building materials are the important manufactures. The Union stockyards plant is valued at more than $1,000,000, and the new Broadway bridge to Winnipeg was built at a cost of $600,000. Saint Boniface is the seat of the Roman Catholic see of Manitoba. A Jesuit college, an academy for boys, two collegiate institutes, and a normal school are here. Population, 1901, 2,019; in 1911, 7,483.

SAINT CATH'ARINE'S, Ont., the county seat of Lincoln County, on the Welland Canal and on the Grand Trunk and Canadian Northern railroads, and on electric lines. The city is twelve miles northwest of Niagara Falls. It is the seat of Bishop Ridley College, and there are a collegiate institute, an armory, county buildings and a city hall. The town has about eighty industries, including machine shops, paper mills, flour and planing mills, electrical machinery, canning factories and flax and silk mills. Electric power is developed at Niagara. Population 1911, 12,484.

SAINT CHARLES, Mo., the county seat of Saint Charles County, fifteen miles northwest of Saint Louis, on the Missouri River, twelve miles from its mouth and on the Missouri, Kansas & Texas and the Wabash railroads. The city is in a rich agricultural region and contains a large car foundry, besides manufacturies of engines, shoes, flour, brick, tile, furniture and other articles. There is also a considerable trade in limestone, tobacco, corn and other farm products. It is the seat of the Lindenwood Female College, Saint Charles Military College, and Sacred Heart Academy. There is also a home for epileptics, a library, a hospital and a county building. The place was settled in 1769 and was incorporated in 1849. For a few years the town was the capital of the Northwest Territory and later of Missouri (1820–1826). Population, 1910, 9,437; in 1917, 10,498 (Federal estimate).

SAINT CHRISTOPHER, *kris'toh fer*, or **SAINT KITTS**, a volcanic island of the Lesser Antilles, British West Indies, discovered by Columbus in 1493 and colonized by the English in 1623. It covers an area of sixty-eight square miles and together with the adjacent islands, Nevis and Anguilla, forms the Leeward Islands. It is traversed by mountains, of which the loftiest is the extinct volcano Mount Misery, 4,000 feet high. The capital is Basseterre, a seaport with an open roadstead. See Travels in Distant Lands, subhead *Among the Lesser Antilles*.

SAINT CLAIR, Arthur (1734–1818), an American soldier, born and educated in Scotland. He reached America as an ensign in the French and Indian War, and took part in the expedition against Louisburg and Quebec. After this war he engaged in manufacturing in Pennsylvania, but at the outbreak of the Revolutionary War was made brigadier-general of the Pennsylvania militia. He organized the New Jersey troops that fought at Trenton and Princeton. In 1777 he was made major-general and given command of Ticonderoga, but evacuated the fort on the approach of Burgoyne. For this act he was court-martialed, but acquitted. Later he fought with Greene in the South. He was elected to Congress, and in 1887 became president of that body. Saint Clair was the first governor of the Northwest Territory, and two years later became commander in

chief of the army of the United States. In 1789 he commanded the expedition against the Miami Indians, but his forces were disastrously defeated. He resigned his commission in 1792.

SAINT CLAIR, Lake, one of the chain of the Great Lakes, but because of its small size not generally included as one of that group. It is joined to the great waterway on the north by Saint Clair River, which flows from Lake Huron, and on the south by the Detroit River, which connects with Lake Erie. The area of the lake is 396 square miles; the greatest length is thirty miles, the greatest breadth, twenty-four miles. A number of islands render the lake and river above it picturesque. See Great Lakes.

SAINT CLOUD, Minn., the county seat of Stearns County, sixty-five miles north of Minneapolis, on the Mississippi River. It is on the Northern Pacific and the Great Northern railroads, and has railroad shops of the latter line. The city is in a grain-growing and stock-raising district, and has large granite quarries which employ 900 men. There is a valuable trade, and the rapids in the Mississippi furnish good water power. There are flour mills, foundries, machine shops, and woodworking establishments. The city has the state reformatory and a state normal school. It also has six small parks, a Carnegie Library, a Federal building, a state reformatory, a hospital and a home for the aged. The place was settled about 1852, and was incorporated in 1868. The commission form of government was adopted in 1912. Population, 1910, 10,600; in 1917, 12,013 (Federal estimate).

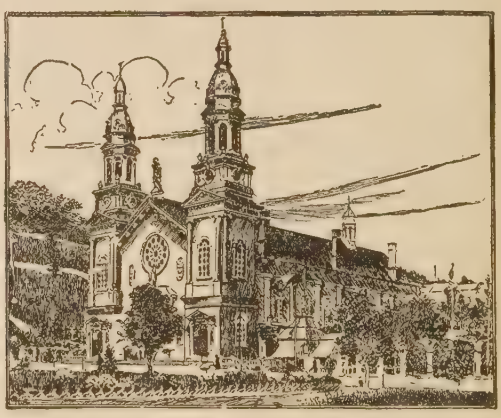
SAINTE ANNE DE BEAUPRE, *bo prā',* Quebec, a village of Montmorency County, situated at the junction of the Sainte Anne and Saint Lawrence rivers. For over two centuries Sainte Anne has been known as a Roman Catholic shrine, and many miraculous cures are said to be performed through the intercession of the saint. In the basilica are great piles of crutches cast aside by pilgrims. The permanent population is about 2,500, but on such feast days as that of Sainte Anne (July 26) over 25,000 have often been present. About 200,000 pilgrims visit the village each year.

SAINT ELI'AS MOUNTAINS, a range of mountains located in the southeastern part of Alaska and the northwestern part of Canada, comprising a broad, elevated chain, with numerous peaks and short ridges. Mount Logan, 19,500 feet high, is the highest peak. Mount Saint Elias is 18,026 feet high. Other prominent peaks to the southeast are Mount Fairweather, Mount Cook and Mount Vancouver. This range of mountains gives rise to numerous glaciers, the largest being the Malaspina.

SAINT ELMO'S FIRE, an electrical display in the form of a circle of light sometimes seen during thunderstorms about the tops of spires and trees, and the masts of ships. It is common in southern regions, and rarely may be seen on the manes of horses and about the human head. Sailors regard Saint Elmo's fire as a friendly omen, and among the ancient Greeks it gave rise to the myth of Castor and Pollux. See Castor and Pollux.

SAINT ETIENNE, *saN a te en',* France, is situated in the department of Loire, on the Furens River, thirty-two miles southwest of Lyons. The town stands in the center of one of the most valuable mineral fields of France; and in addition to having extensive collieries, blast-furnaces and other iron works in the vicinity, it manufactures silks, cutlery and firearms, and is one of the largest centers in the world for the manufacture of ribbons, the yearly output of which exceeds $12,000,000 in value. The collieries alone employ about 16,000 men. Population, 1911, 148,656.

SAINT GAU'DENS, *gaw'denz,* Augustus (1848–1907), the most distinguished of



SAINTE ANNE DE BEAUPRE

American sculptors, largely credited with the development of a distinctive plastic art in the United States. Born in Dublin, he was taken

to America when three months old. His early years were spent in the employ of a cameo cutter, but he later studied in New York, Paris and Rome. It was in the latter city that he executed his first statue, *Hiawatha.* Among other notable productions are *Admiral Farragut,* in New York; *Abraham Lincoln,* in Chicago; and the statue of *Diana,* which was placed on the roof of the Agricultural Building at the World's Columbian Exposition, Chicago, 1893. The *Shaw Memorial,* on Boston Common, and the bronze equestrian statue of *Sherman,* in Central Park, New York, counted among the half dozen finest equestrian statues in the world, are the most celebrated of the sculptor's works. Saint Gaudens is equally famed for the rare charm of his low reliefs, the most notable being those of Bastien-Lepage and Robert Louis Stevenson.

SAINT GEORGE AND THE DRAG'ON, a legend of the patron saint of England, symbolizing the conquest of paganism by Christianity. According to the story, the country had been terrorized for years by a dragon which, after having exacted the sacrifice of all the sheep in the land, was demanding its daily toll of human lives. One day as Saint George was riding across a marsh he encountered a procession led by the king's daughter, clad in bridal attire, who was to be the next victim. Saint George promised the people deliverance, and charging upon the approaching dragon, injured it with his magic sword Ascalon. The dragon at once became weak and meekly followed the procession to the market place, where Saint George killed it with his sword. Saint George then told the people that it was God's power which had enabled him to conquer the demon, and he exhorted them to give up their idols and accept Christianity. The princess later married her brave knight rescuer. Edward III of England made Saint George the patron of the Knights of the Garter, and one of the insignia of that Order is a jeweled figure represented as slaying the dragon. A Russian Order of Saint George was founded by Catharine II in 1769. Raphael's painting of the slaughter of the dragon hangs in the Louvre, Paris.

SAINT GEORGE'S CHANNEL, the arm of the Atlantic Ocean which separates Ireland from Wales and connects the Irish Sea with the Atlantic Ocean. It extends from Holyhead and Dublin, on the north, to Saint David's Head and Carnsore Point, and is about 100 miles long, with breadth varying from sixty to ninety-five miles.

SAINT GOTTHARD, *saN go tahr',* a mountain group in Switzerland, belonging to the Lepontine, or Helvetian, Alps, which it connects with the Bernese Alps. Monte Leone, the highest peak, is 11,694 feet in altitude. Other high peaks are Waserhorn, 10,727 feet, and Bortelhorn, 10,481 feet.

Saint Gotthard Tunnel, a tunnel through the Saint Gotthard Pass, in the Alps, affords railway communication between Italy and Germany. It is 9¼ miles long, 26 feet wide and 21⅓ feet high. The tunnel is lined with masonry throughout its entire length. The roof is a brick arch, and the sides are of rubble. The expense of construction was assumed jointly by the governments of Italy, Switzerland and Germany. At its highest point this tunnel is 3,786 feet above sea level and 3,150 feet below the surface of the mountain. The entrances are reached by spiral tunnels, through which the railway ascends.

SAINT HELENA, *hel é'na,* a British island in the South Atlantic where Napoleon lived in exile from 1815 to his death, May 5, 1821 (see NAPOLEON I). It covers an area of forty-seven square miles and is situated 1,200 miles west of the nearest African coast. Many vessels make it a halting place, as it is in the direct line of ocean communication by way of the Cape of Good Hope. About one-fifth of the entire surface is available for cultivation, which is given over to farm and garden produce. The population, which approximates 3,550, consists of mixed Europeans and natives of Africa and of the East Indies. Jamestown is the port and only town of the island.

SAINT HYACINTHE, QUE., the county seat of Saint Hyacinthe County, on the Yamaska River, which almost encircles the city, and on the Grand Trunk, Canadian Pacific, Intercolonial and Quebec, Montreal & Southern railways. Saint Hyacinthe has excellent schools and is the seat of a seminary, two convents, the Academie Prince for girls and Academie Girouard for boys. It also has a branch of the Sacred Heart College of Athabaska and the provincial dairy school, probably the first dairy school in Canada. The principal manufacturers are boots and shoes, threshing machines, musical instruments, corsets, biscuits and knit goods. Population, 1911, 9,797; in 1916, about 12,500.

SAINT JOHN, N. B., the county town of Saint John County and largest city of the province, is situated on the southern shore of the province, on a peninsula overlooking the Saint John River and the Bay of Fundy, 245 miles by rail northwest of Halifax. It is on the Intercolonial and the Canadian Pacific railways. The city is regularly laid out and contains a number of good buildings. It ranks very high among the shipping centers of the world, and it has direct steamship connection with London, Liverpool, Glasgow, Bristol, Dublin, Belfast, Havre, Antwerp, South Africa, and the West Indies. Its annual trade amounts to more than fifty millions of dollars. The harbor is owned and managed by the city. It is free from ice throughout the year. The leading industries of the town include the manufacture of cotton and woolen goods, boots and shoes, machinery, tools, wooden ware, carriages, agricultural implements, lumber, paper, soap and candles. The fisheries are also important, giving employment to several hundred men. Saint John was chartered in 1785. It was nearly destroyed by fire in 1877 but was rapidly rebuilt. Population in 1911, 42,511; in 1916, estimated, 60,000.

SAINT JOHN OF JERUSALEM, KNIGHTS OF. See JOHN, KNIGHTS OF SAINT.

SAINT JOHN RIVER, often called the "Rhine of America," is the largest river in the province of New Brunswick. It was so named by Champlain and De Monts in honor of John the Baptist. It originates from two branches, one rising in the northern part of Maine and the other in the province of Quebec, and flows northeastward and then southeastward, entering the Bay of Fundy. Its length is about 500 miles, and for 225 miles it is navigable for small steamers during high water; while larger boats ascend the river as far as Fredericton. In the upper part of its course the Saint John forms a portion of the boundary between Maine and the provinces of Quebec and New Brunswick. The city of Saint John is situated at its mouth. At Saint John, just before the river enters the Bay of Fundy, are the noted Reversing Falls.

SAINT JOHN'S, NEWFOUNDLAND, the capital of the province, is situated on the northern point of the southeastern peninsula of the island, 550 miles northeast of Halifax, on the Newfoundland Railway. The city occupies a commanding site, which rises abruptly from the harbor, which is landlocked and guarded by modern fortifications. Among the chief public buildings are the Roman Catholic cathedral, the Anglican cathedral, the house of parliament, the postoffice and government house, Saint John's Athenaeum and Saint Bonaventure College. The inhabitants are chiefly engaged in fisheries and in the refining of seal oil. Other industrial establishments worthy of mention include foundries, machine shops, tanneries, soap factories, and manufactories of boots and shoes. It is an important station for the Atlantic whaling and sealing fleets. Population, 1911, 32,292; in 1916, estimated, 35,000.

SAINT JOHNS, QUE., the county town of Saint Johns County, is situated on the Richelieu River, twenty-seven miles southeast of Montreal, and on the Grand Trunk, Central Vermont and the Canadian Pacific railways. The leading manufactures include furniture, sewer tile, sewing machines, silks, straw hats, and umbrellas. The city also has an important lumber and grain trade. Population, 1911, 5,903; in 1916, estimated, 6,500.

SAINT JOHN'S RIVER, a river in Florida about 350 miles in length, flowing northward almost parallel to the coast and emptying into the Atlantic sixteen miles east-northeast of Jacksonville.

SAINT JOSEPH, Mo., the county seat of Buchanan County, and the third city of the state, smaller than Saint Louis and Kansas City. It is on the Missouri River, sixty miles northwest of Kansas City, and on the Atchison Topeka & Santa Fé, the Chicago, Rock Island & Pacific, the Hannibal & Saint Joseph, the Kansas City, Saint Joseph & Council Bluffs, the Chicago, Burlington & Quincy, the Chicago Great Western, the Missouri Pacific and Saint Joseph & Grand Island railroads. The town is connected by a steel bridge with Elwood, Kan., over 4,200 feet long. It is built along the bluffs, close to the river, on which it has a frontage of about three miles. Among the important buildings are a Carnegie Library (there are also two other libraries), a courthouse, the Live Stock Exchange, a postoffice, a city hall, an auditorium, Y. M. C. A. and Y. W. C. A. buildings, a large hotel and several imposing business blocks. One of the state hospitals for the insane is located here, also the state fish hatchery. The educational institutions include two medical colleges, Sacred Heart

Academy and a number of private and parochial schools. The leading charitable institutions are the Memorial Home for Aged People, Saint Joseph's Hospital, Ensworth Hospital and Noyes Hospital. Among the educational institutions are a Junior College and three Catholic schools. There are three high schools.

Saint Joseph is the third industrial city of the state. The chief industries are connected with slaughtering and meat packing, and the amount of business done by the packing houses exceeds $70,000,000 each year. Other important industries include the manufacture of overalls and shirts, harness, collars, saddles, plows, trunks, furniture, shoes, flour, woolen goods, machinery and foundry products.

The first settlement was made in 1826 by an indian trapper and trader. The first post-office was established in 1840, and the town was laid out in 1843 and given its present name. It became the county-seat three years later and in 1851 was chartered as a city. During the emigration to the California gold fields, Saint Joseph was an important outfitting post. The commission form of government was adopted in 1909. Population, 1910, 77,403; in 1917, 86,498 (Federal estimate).

SAINT KITTS. See SAINT CHRISTOPHER.

SAINT LAWRENCE, GULF OF, a large indentation of the Atlantic Ocean, separating Newfoundland from New Brunswick and Nova Scotia, and extending into the province of Quebec. Next to the Gulf of Mexico, it is the largest gulf on the Atlantic coast. It is partially enclosed by Newfoundland and Cape Breton Island, and it communicates with the Atlantic by three channels—the Strait of Belle Isle, separating Newfoundland from the mainland; the Strait of Canso, between Cape Breton and Nova Scotia, and Cabot Strait, sixty-three miles wide, forming the main outlet. Anticosti and Prince Edward Island are the largest islands in the gulf; besides these, there are the Magdalens and a number of other small groups. As the outlet of the Saint Lawrence River, this gulf forms the entrance to the chief waterway to the interior of Canada, and is of great commercial importance. It was discovered and named by Jacques Cartier in 1536.

SAINT LAWRENCE RIVER, one of the largest rivers of North America, which with its tributaries drains the basin of the Great Lakes and the southeastern part of Canada, an area of 500,000 square miles. The Saint Lawrence is generally supposed to rise in Lake Ontario, from which it flows in a broad channel, but its real source is the Saint Louis River in the northeastern part of Minnesota, which enters Lake Superior at Duluth. The Saint Mary's River joins Lake Superior and Lake Huron, the Saint Clair River, Lake Saint Clair and the Detroit River form the connection between Lake Huron and Lake Erie, and the Niagara River flows from Lake Erie to Lake Ontario.

The Saint Lawrence is one of the great rivers of the world; some authorities consider it second only to the Amazon in the volume of water it discharges. The main stream extends from Lake Ontario to the Gulf of Saint Lawrence, and is about 750 miles long. The average width of its channel is one and one-fourth miles, but in a number of places there are broad expanses called *lakes*. The largest of these are Lake Saint Francis, thirty miles above Montreal, and Lake Saint Peter, between Montreal and Quebec.

Between Lake Ontario and Montreal there are a number of rapids caused by the outcropping of layers of rock in the bed of the River. The Long Sault, the Cascades, the Cedars and the Lachine, just above Montreal, are the most noted. Light river steamers going down stream pass through the rapids with safety, and the experience of "shooting the rapids" is very enjoyable to the passengers. A series of canals is used by boats going up stream. For about forty miles after leaving Lake Ontario the channel is studded with islands, forming the famous Thousand Island Park. On many of these islands there are beautiful summer residences, which add much to the beauty of the park. The chief tributaries from the north are the Ottawa, the Saint Maurice, the Montmorency and the Saguenay. Those from the south are the Richelieu and the Chaudière.

The Saint Lawrence is the only great waterway admitting ocean-going ships to the interior of the continent. Montreal, at the head of navigation, is the natural meeting place of ocean and inland traffic, and this advantage has been the chief element in the city's growth.

SAINT LEGER, *sant lej'er,* or *sil'in jer,* BARRY (1737–1789), a British soldier who fought in the French and Indian Wars and the American Revolution. He commanded the unsuccessful expedition against Fort

Stanwix in 1777 (see REVOLUTIONARY WAR IN AMERICA), and attained the rank of colonel in 1780, in which year he published his *Journal of Occurrences in America.*

Courthouse

SAINT LOUIS, *loo'is,* or *loo'e,* Mo., the largest city in the United States west of the Mississippi River, and fourth in population among cities of the country as a whole, according to Federal estimates. In 1910 the population was 687,029; in 1918, 779,951 (estimate).

General Description. Saint Louis is situated on the west bank of the Mississippi River, twenty-one miles below the mouth of the Missouri, 283 miles southwest of Chicago, 599 miles south of Saint Paul and 709 miles north of New Orleans. On the opposite bank of the river is East Saint Louis, Ill., the second city in size in that state. The city extends along the river for a little oven nineteen miles, and reaches westward for about seven miles. Its area is sixty-two square miles. The site is high and gently undulating land, which rises gradually from the Mississippi, the country to the west of it being a rolling plain of about 200 feet altitude.

The city is admirably laid out. The eastern boundary conforms to the great bend in the river, and the streets near this are parallel with the river bank; farther westward they gradually straighten and assume a north and south direction. Most of the streets crossing these extend east and west. Market Street divides the city into north and south sections for numbering, all of the streets that cross Market being called *north* on one side of it and *south* on the other side. The streets running north and south are numbered, beginning with the river and extending as far as Twenty-fifth Street. Those running east and west are named, and in numbering the buildings, each block begins a new hundred. Broadway is one of the chief streets extending north and south, and it runs parallel with the river. This and Olive Street are the fashionable promenades and also contain the leading retail stores. Washington Avenue is one of the widest and handsomest streets in the city. Near the river this is occupied by the wholesale dry goods trade, and its western portion is given to fashionable residences. The fashionable part of the city is at the west end, and Lindell Avenue is one of the principal streets passing through it. Interesting landmarks are the old houses in which Eugene Field and U. S. Grant lived.

Parks. The public parks and squares embrace over 2,200 acres. Among the largest parks is Forest Park, on the west side, covering nearly 1,400 acres. It contains the museum of fine arts and the zoölogical gardens. Parts of it are heavily wooded with oak, but the western half was cleared to make room for the Louisiana Purchase Exposition. Carondelet Park, on the south side, has an area of 180 acres and is noted for its beautiful scenery. In the south-central part of the city is Tower Grove Park, still larger, containing beautiful lawns and shrubbery, and celebrated for its statues of Shakespeare, Humboldt and Columbus. Near this on the north is Shaw's Garden, officially known as the Missouri State Botanical Garden. This park is famous for its botanical garden and its arboretum, which contains all kinds of trees and shrubbery that will grow in the climate. On the north side of the city are O'Fallon Park, of 160 acres, bordering on the bluffs of the river, and Fairground Park, which contains a zoölogical garden, a large amphitheater and a race course. There are many smaller parks scattered about the city. Of these, Lafayette Park was formerly the most beautiful, but the tornado in 1896 destroyed nearly all of its fine trees. This park contains a fine statue of Thomas H. Benton. Forest, Tower Grove, O'Fallon and Carondelet parks are connected by fine boulevards.

Buildings. Saint Louis is well built, and its appearance gives an impression of strength and durability, rather than of ornament. Nearly all buildings are of brick or stone. The older part of the city, near the river, contains a few buildings of historic interest, in which traces of the old colonial style of architecture are still found, but they are not otherwise important. Among the public buildings is the courthouse, on Broadway, in the form of a Greek cross, surmounted by a dome nearly 200 feet high. The interior of the dome is decorated with frescoes, illustrating events in the history of the city or country. The Federal building, on Olive Street, is a magnificent structure of granite, erected at a cost of $8,000,000. It

contains the customhouse, the United States subtreasury and the downtown branch of the postoffice. The new public library covers two blocks between Thirteenth and Fourteenth and Olive and Saint Charles. The city hall, a modern structure of brick and stone costing over $2,000,000, occupies an entire block. To the west are the municipal court buildings, and at Market and Eighteenth streets is the Union station, one of the largest and finest buildings of its kind in the world. The Coliseum has a seating capacity of 15,000. Among the notable business blocks are the Mercantile Library, the building of the board of education, the railway Exchange, Odd Fellows' Hall, the Commonwealth Trust, the Equitable, the Boatman's Bank, the Laclede, the Union Trust, the Bank of Commerce, and the Merchants' Exchange buildings.

Other buildings of note are the new Roman Catholic Cathedral, erected at a cost of $3,000,000; the Protestant Episcopal Cathedral, the Second Presbyterian Church, the Pilgrim Congregational Church, the Union Methodist Church, the Shaare Emeth Synagogue and the Museum of Fine Arts. The Planters' and the Southern hotels are new and commodious structures, built upon the sites of the old hotels of the same names, which previous to the Civil War were among the most famous hostelries of the Union. The Jefferson, the Hamilton, the Washington, the Majestic, the Warwick, and the Marquette are large, well-appointed hotels in newer parts of the city.

Institutions. Washington University (which see) is the leading educational institution. This occupies a beautiful site overlooking Forest Park. Next in importance is the University of Saint Louis, a Catholic institution. The city maintains a teachers' college in connection with its public schools, and there are numerous institutions of learning maintained by the various denominations. The libraries include the public library of over 415,000 volumes, occupying a building erected through the generosity of Andrew Carnegie, who gave the city $1,000,000 for the purpose, and the Mercantile Library containing about 130,000 volumes and occupying its own building. The rooms of this library are also of interest because of their collections of paintings and statuary. The city maintains a dispensary, a hospital, an asylum for the insane and a reform school. The state school for the blind is also located here. Besides these institutions, there are numerous others of a charitable and philanthropic nature, maintained by various organizations.

Industries. Saint Louis is the distributing point for a large section of country to the south and southwest, including Texas and Mexico. It is the terminus of more than a score of railways, and consequently has an important wholesale trade and is one of the largest centers of transshipment in the country. The Mississippi is crossed by the great Saint Louis, or Eads bridge, a structure of granite and steel, which provides a double railway track, sidewalks, a carriage road and street car tracks. The bridge leads into a tunnel for railroads, which passes for more than 4,000 feet under the business portion of the city (see EADS, JAMES B.). Three miles north of the Eads bridge is the Merchants' bridge, and between the two is the McKinley bridge. In connection with the wholesale business and the transshipment of goods is maintained the Cupples station. In this the freight entering the city over its various lines of railway is handled. The city has an important river traffic, since the river is navigable to this point at all seasons of the year.

Saint Louis is one of the largest fur markets in the United States, having begun its career as a fur-trading post. It is also a great horse, mule and tobacco market, and a leading center in the middle west for the marketing of boots and shoes. The manufacture of boots and shoes takes first rank among manufacturing enterprises, while the tobacco industries rank second. There are also immense plants engaged in the manufacture of woodenware, hardware, railway cars, clothing, furniture and hundreds of other commodities.

History. In 1763 the territory west of the Mississippi, with other American possessions, was ceded by France to Spain, but the latter did not take possession until 1770. The first settlement was made in 1764, and the village was named in honor of Louis XI of France. A year later it was made the capital of Upper Louisiana. It remained under Spanish control until 1800, when it was receded to France, and in 1803 it became a part of the United States by the purchase of Louisiana. Following this, settlers rapidly crossed the Mississippi River, and Saint Louis began to increase in population.

From the start it was a center of trade and supplies, and as the country to the west and south continued to be settled, the town increased in importance. A large number of Germans early settled in the city, and their influence on its business and institutions has always been strong. During the Civil War Saint Louis contained Union and Confederate sympathizers, though the former were in the majority. After the close of that conflict the city continued to grow and prosper. Its business interests have always been conducted on a solid financial basis and after the most conservative methods. In 1896 the city suffered from a tornado which caused widespread destruction. In 1904 it was the site of the Louisiana Purchase Exposition, the largest world's fair that had been held up to that time. An elaborate historic pageant, held in Forest Park in 1914, attracted thousands of visitors.

SAINT MARK'S, CATHEDRAL OF, a celebrated church in Venice and one of the world's most beautiful structures, faces the east side of the Square of Saint Mark's, or the Piazza. It is so named from the patron saint of the city, Mark, the apostle.

The first church on the site of the cathedral was begun in 830. This was destroyed and was rebuilt in 976. The second church was also destroyed, by fire, and in the eleventh and twelfth centuries it was reconstructed in Byzantine style. The additions made in the fifteenth century were Gothic. Until 1807 Saint Mark's ranked only as a church and was the chapel of the rulers of Venice, but since that date it has been the cathedral of the city.

The cathedral, which is about 250 feet in extent from east to west, and 170 feet from north to south, contains over 500 columns, each in richly ornamented Oriental style. In its present form it is a Greek cross, surmounted by a dome at the end of each arm and one in the center. The west front has five large porches, each so deep that the roof over them forms a spacious balcony. In front of the church are three bronze sockets, in which were formerly placed the flagstaffs which supported the banners of Venice.

The cathedral itself is a curious structure, combining several different styles of architecture. The roof is covered with small cupolas, like those of mosques, and the building contains a number of rows of arches, one above the other. The interior is finished almost entirely in mosaic, set in a golden groundwork. Over the central door is a mosaic of Christ, Mary and Saint Mark. In the three domes of the nave are representations of David, Solomon and the prophets; the ascension; the descent of the Holy Ghost, and the Holy Trinity. On the chancel screen are fourteen marble statues of Saint Mark, Mary and the twelve apostles. Another mosaic represents the genealogy of Mary. The church also contains many bronzes and other objects of interest, dating from the fourteenth and fifteenth centuries. See VENICE.

SAINT MARY'S RIVER, a river connecting Lake Superior with Lake Huron. It is about forty miles long, and forms the boundary between Ontario and the northern peninsula of Michigan. Its course is southeast. The famous Sault Ste. Marie Rapids form the beginning of the river, which is about a mile wide as it leaves Lake Superior. Ship canals on the Canadian and American sides enable boats to pass around the rapids. At the upper end of the rapids the river is spanned by a bridge of the Canadian Pacific Railway. The river is broad, and contains many large islands. Its shallow places have been dredged for lake vessels, and it is one of the most important waterways of the world. See SAULT STE. MARIE CANAL.

SAINT MAURICE, *mawr'is*, a river of the province of Quebec, rising in a chain of lakes and flowing southeasterly into the Saint Lawrence, at Three Rivers. It is about 350 miles long and its chief tributaries are the Ribbon and the Vermilion, from the west, and the Bastonnois and the Croche, from the east. Numerous cascades and a fall of 160 feet about twenty-two miles above its mouth add to the picturesqueness of its course.

SAINT-NAZAIRE, *saN'na-zair'*, FRANCE, one of the great seaports of the country, capital of an arrondissement (province) in the Loire region, at the mouth of the Loire River, forty miles west of Nantes. The fine harbor was enlarged during the World War, and became an important port for landing and embarkation of troops of the American expeditionary forces in that struggle. Before the war its foreign trade was worth about $8,000,000 a year; the chief shipments were woolen goods, wine, silk and fruit, brought by rail and river from the interior, and the products of iron foundries, flour and lumber mills of the city. Population, 1911, 38,267.

The New Cathedral

SAINT PAUL, MINN., one of the "Twin Cities of the Northwest," the capital of the state, twenty-seventh city in size in the United States and second in the state, is at the head of navigation on the Mississippi River. It is 1,900 miles north of New Orleans, 410 miles northwest of Chicago, 1,340 miles from New York and 1,823 miles east of Seattle, and is served by the Great Northern, the Northern Pacific, the Chicago & North Western, the Chicago, Milwaukee & Saint Paul, the Chicago, Burlington and Quincy, the Chicago, Rock Island and Pacific, the Chicago, Saint Paul, Minneapolis & Omaha, the Chicago Great Western, the Soo Line and the Minneapolis & Saint Louis railway. The area of the city is about fifty-six square miles; it joins Minneapolis on the west.

Saint Paul proper is confined to the east bank of the river, really the north bank, since opposite the city the Mississippi flows in a slightly southeast direction. The portions across the river belong to the municipalities of West Saint Paul and South Saint Paul, though these are usually included when speaking of Saint Paul as a whole. The city occupies a beautiful site, on bluffs which rise from the river in a series of terraces. Lying on the lowest level next to the river are found the railway yards, the wharves, the union depot and most of the wholesale houses; the second level is devoted almost entirely to the retail trade, the hotels and some of the public buildings, while the highest level is occupied by residences. The city is admirably laid out, the streets being broad and nearly all of them well paved. In the residential sections they are ornamented by shade trees and lawns. Several bridges for carriages and foot passengers and a number of railway bridges cross the Mississippi.

Saint Paul has an extensive system of parks and parkways, including about eighty recreation spots, with a total area of 1,500 acres, and many miles of parkways. The most beautiful of the latter is the River Drive, extending from the end of Summit Avenue Boulevard along the bluffs of the Mississippi to Fort Snelling. Como Park, 323 acres, is the most noted of the parks; it includes lakes and stretches of woodland, making it one of the most beautiful parks in the country. Mound Park (70 acres) and Phalen Park (216 acres), noted for their beauty and interesting features, are also important. The parkway system connects the parks with each other and with the chief centers in the city. Adjoining the city on the north are the grounds of the Minnesota Agricultural Society.

The water system provides an abundant supply of pure water, drawn from spring-fed lakes and artesian wells. The lakes are under control of the city and their shores are patrolled and the waters protected from pollution.

The city has a number of fine public buildings. Chief among these is the state capitol, occupying an eminence on the North Side (see illustration, article MINNESOTA). It is constructed of Georgia marble, with Minnesota granite for its foundation and steps, and is one of the finest buildings in the United States. Its large white dome, 220 feet high, is visible from all points of approach to the city. The interior is finshed in marble and other costly varieties of stone, some of which were imported from central Africa. Among the decorations of the interior are mural paintings by John La Farge, Kenyon Cox, Edwin Howland Blashfield and other famous artists, depicting both allegorical subjects and scenes from the state's history.

Other public buildings of importance are a Federal building, a city hall and a municipal auditorium, built and owned by the city, with a seating capacity of 10,000. There are many other notable buildings, among them being a Y. M. C. A., a Y. W. C. A., the largest railway office building in the country and a great public library. There are six national banks, twelve state banks and three savings banks. A new passenger station to cost $10,000,000, with terminals, was under construction in 1919. Merchants' National Bank, the Pioneer, the Commerce, the Germania Life, the New York Life, First National Bank, the Saint Paul Hotel and Capital National Bank buildings are noteworthy structures. The recently completed magnificent Roman Catholic Cathedral, Saint Paul's (Episcopal), the First Methodist, the Christian Scientist, the House of Hope (Presbyterian), the People's Church, the Park Con-

gregational and the First Baptist are the leading church edifices.

Among the educational institutions in the city are Hamline University, Macalester College, Concordia College, College of Saint Thomas, Saint Paul's Seminary, Saint Paul's College of Law and three Lutheran seminaries. The State College of Agriculture and the experiment station are at Saint Anthony Park, west of the city limits. The city has a public library containing 250,000 volumes, the state law library of 75,000 volumes, and the Ramsey County medical library of 10,000 volumes. Each of these is open to the public without charge. The new public library and the J. J. Hill Reference Library, together cost $1,500,000. Public baths, as well as outdoor gymnasiums for boys and girls, are located on an island in the Mississippi. Several orphan asylums, the city hospital and a number of private hospitals also do good work.

The location of Saint Paul at the head of navigation on the Mississippi made it at the outset an important trading post, and the position thus early gained has been maintained during the development of the surrounding country. Saint Paul has been and still is the leading distributing center of the Northwest, and annually handles a wholesale trade in excess of $500,000,000. It is the meeting place of ten trunk lines of railway, whose total mileage exceeds 50,000 miles, and has an extensive passenger and freight traffic. The leading citizen of the town, James J. Hill, was the master railroad builder of the United States.

The city is also an important manufacturing center, and the value of its manufactured products exceeds $80,000,000 annually. St. Paul has the largest law book publishers, the largest grass carpet factory, and the largest plant for the exclusive manufacture of hoisting machinery, in the world. At South Saint Paul are located the Union Stock Yards, the center of a large meat packing industry. The city has an excellent system of street railways, with lines connecting it with Minneapolis, Stillwater and other points.

The Indian name of Saint Paul was Innijiska, which means *the white rock*. The first white settlers were French traders, who located an outpost here for trading with the Indians. It is supposed that this settlement dates from 1658. The present name dates from 1841, when Father Haultier erected a log chapel at the corner of Third and Minnesota streets and named it Saint Paul's Chapel. From the time that the land in the Northwest was thrown open to settlement, the city continued to grow.

Saint Paul is a city of homes, and its residence areas are beautified by shade trees and diversified by hills and valleys. From the beginning the city has been remarkably free from disaster by fire, flood or disease, and it has had a steady, conservative growth, commensurate with the growth of the Northwest. The commission form of government was adopted in 1909. Population in 1910, 214,744, an increase of over 50,000 in ten years; in 1917, 252,465 (Federal estimate).

SAINT PAUL DE LOANDA, *lo ahn'dah*, ANGOLA, also called LOANDA, is the chief city and the capital of the Portuguese colony of Angola, in West Africa. It has a large harbor, the entrance of which is obstructed by sandbars. The city was formerly the center of the slave trade between Africa and Brazil, and is a very old settlement. In the seventeenth century it was famous for its fine churches and monasteries. Among the exports are ivory, coffee, rubber, hides and palm oil. A railway connects it with Ambaca. Population, 1913, estimated, 25,500, 1,800 of whom are Europeans.

SAINT PAUL'S CATHEDRAL, in London, begun by the famous architect, Sir Christopher Wren, in 1675, and completed by him in 1710, is one of the finest domed buildings of Europe and the most imposing modern structure in England. It has the usual proportions of the English Gothic church, but is Renaissance in style, the dome being its prominent feature. The lantern terminating the dome is 360 feet above the pavement. Next to the dome, the best portion is the west front, with its portico and bell turrets.

Saint Paul's is the most magnificent of Protestant churches. The site of the present building was occupied about 610 by a Christian church, which was destroyed by fire in 1087. This was succeeded by a more splendid building, now known as "Old Saint Paul's." This, also, was burned, in the great fire of London, in 1666. The plan made by Wren for the present structure was materially modified by a decree of the clergy, which resulted in some awkward architectural compromises in the detail of the structure.

Among notable persons buried in the crypt at Saint Paul's are its architect, Sir Chris-

SAINT PETER'S, ROME

topher Wren, Nelson, Wellington, Collingwood, Moore, Howe, Roberts, Barry, Opie, West, Reynolds and Lord Salisbury.

SAINT PE'TERSBURG, FLA., in Pinellas County, twenty-one miles south of Tampa, on a peninsula which separates Tampa Bay from the Gulf of Mexico. It is on the Atlantic Coast Line and the Tampa & Gulf Coast railroads. The town is one of Florida's most important winter resorts, and claims to have sunshine every day of the year. It is governed on the commission plan, adopted in 1913. There is a Carnegie Library and a hospital. Population, 1910, 4,127; in 1917, about 12,000 (Directory estimate).

SAINT PETERSBURG, RUSSIA, the former name of the capital of the country, changed to Petrograd in 1914 after Russia entered the war against Germany and Austria-Hungary. See PETROGRAD.

SAINT PETER'S CHURCH, the largest and one of the most magnificent churches in Christendom, located at Rome. It is a cruciform building, in the Italian style, surmounted by a lofty dome, built on the site where Saint Peter is said to have been buried and where many Christians suffered martyrdom under the pagan emperors.

In 306 Constantine the Great erected on this spot a basilica of great magnificence. During the residence of the Popes at Avignon (1309–1376), it threatened to fall into ruins, and Nicholas V commenced work upon its reconstruction. Advance was slow until Julius II (1503–1513) decided on the erection of an entirely new building and laid the foundation stone of the new cathedral in 1506. The famous Bramante was its first architect. After his death various architects had charge of the work until the appointment, in 1546, of Michelangelo, who nearly completed the dome and a large portion of the building before his decease (1564). The nave was finished in 1612, the façade and portico in 1614, and the church was dedicated by Urban VIII in 1626.

The extensive colonnade, which surrounds the piazza and forms a magnificent approach to the church, is supported by 264 columns, 48 feet high, in four rows. The piazza is oval in form and is adorned with an obelisk over 80 feet high, of red granite brought from Egypt in the reign of Caligula, and by two magnificent fountains, the finest in Rome. The height of the dome from the floor is 435 feet, and the exterior diameter is 195 feet. The length of the cathedral within the walls is 613 feet, the width 87 feet. The magnificent canopy over the lofty altar is 95 feet high. Near this canopy is the famous bronze statue of Saint Peter represented as seated in a chair, with right foot extended. The floor of the cathedral covers nearly five acres, and the cost is estimated to have exceeded $50,000,000. The interior is elaborately decorated with many-colored marble columns, a few costly paintings, numerous fine mosaics, marble statuary and monuments, and it forms a valuable museum of architecture and sculpture.

SAINT QUENTIN, *kahN taN'*, FRANCE, situated on the River Somme, ninety-five miles northeast of Paris. It was formerly an important frontier post between France and the Low Countries. The buildings of note before 1914 were the church, dating from the twelfth century, the hotel de ville, the palace of justice and the museum. The industries included the manufacture of cotton and woolen goods. The city is noted for important battles, in 1557, in which the French were defeated by the Spaniards under Philip II, and January, 1871, in which the town was captured by the Germans. Its imperishable fame came in the World War, from 1914 to 1918. The Germans captured it in the early days of the war and held it until the summer of 1918, when their hordes were driven back. Bombardments reduced it to partial ruins. Population, 1911, 55,571.

SAINT-SAENS, *saN sahN'*, CHARLES CAMILLE (1835–), a distinguished French composer and pianist. He studied in Paris at the conservatory and won several prizes for his compositions. Later he held several important positions as organist in Paris churches, but abandoned this to devote himself to composition and concert. Although he composed several operas, of which *Samson and Delilah* is best known, his fame rests upon his instrumental music and orchestration.

SAINT SOPHIA, *so fe'ah*, the largest Mohammedan mosque in the world, and the most famous structure in Constantinople, was built for a Christian church by the Roman Emperor Justinian the Great, in whose reign it was completed, in 538. The building is rectangular, and its exterior is unattractive, but the beautiful interior makes it one of the architectural wonders of the world. The structure is 250 feet from east to west and 235 feet from north to south. The interior

is divided by piers and columns into naves and aisles, and the great hall of worship is surmounted by a dome 180 feet high and 107 feet in diameter, and supported on four arches, each having a span of about 100 feet. This dome is the most impressive feature of the structure. In the base of the dome are the windows by which the edifice is lighted. A half dome extends east and west from the cornice of the dome, so the great hall of worship is covered with a dome-shaped roof.

The walls are finished with marble of different colors, arranged in beautiful designs, and the vaulting is set in beautiful mosaic. When the church was converted into a Mohammedan mosque all Christian emblems were covered or torn from the walls.

SAINT THOMAS, one of the Virgin Islands of the United States, which were purchased from Denmark in 1917, when they were known as the Danish West Indies. Saint Thomas is one of the three principal islands of the group, the others being Saint Croix and Saint John. It has an area of twenty-eight square miles and a population (census of 1917) of 10,191. The natives are blacks. Charlotte Amalie, the capital and chief town, lies on the best harbor in the Virgin Islands. (For a description of the town, see TRAVELS IN DISTANT LANDS, subhead *Among the Lesser Antilles.*)

The harbor is situated about midway on the southern side of the island, seventy miles east of the Porto Rican town of San Juan, and 1,442 miles from New York City. It is an important coaling station for vessels bound for South America by way of the Panama Canal. Though small, the harbor is admirably protected from storms by two islands and by fringing ledges, and can accommodate vessels drawing not over thirty feet of water. Little agriculture is carried on in the island because of lack of plantation labor. The chief occupation of the natives in Charlotte Amalie is work connected with the coaling and provisioning of vessels entering the port. Honduras, a small settlement west of the town, is a fishing village of 200 inhabitants. There are no railroads. See VIRGIN ISLANDS OF THE UNITED STATES.

SAINT THOMAS, ONT., county seat of Elgin County, fourteen miles south of London, on the Canadian Pacific, the Grand Trunk, the Michigan Central, the Pere Marquette and the Wabash railroads. It has important manufacturing industries, and is noted for the construction of cars and car wheels. It has a collegiate institute, an old people's home and a hospital. Population, 1911, 14,054; in 1918, about 17,000.

SAINT VINCENT, *vin'sent*, one of the islands in the British West Indian colony known as Windward Islands. Its area is 150 square miles, of which one-fourth is under cultivation, and the population in 1917 was 49,422. The island is of volcanic origin and has suffered much from the eruptions of Mount Soufrière, which is about 3,000 feet high. The capital is Kingstown, on the bay of the same name, near its southwest extremity. Saint Vincent is especially noted for the excellence of its arrowroot and sea island cotton.

SAINT VITUS'S DANCE, or **CHOREA**, *ko re'ah*, a nervous disease due to the presence of an infectious germ in the brain and spinal cord. It most frequently attacks children, especially girls, between the ages of five and fifteen. It is characterized by twitchings in the muscles of the face, and jerky movements of the arms, legs, hands, feet, back and abdomen. It is usually caused by overwork, worry, lack of nutrition or excessive nervousness, but may be associated with rheumatism or diseased tonsils. The patient is unable to control the movements, which may persist for several weeks or months, though they usually stop during sleep. The disease is seldom fatal.

Treatment consists of rest from all violent physical and mental exercise, cold spongings, nourishing food, and sometimes the administration of iron and arsenic. The person affected should be placed under the care of a physician.

Saint Vitus's dance takes its name from the fact that in Europe in the sixteenth century those afflicted with the disease sought relief at the shrines of various saints, the chief of which was the Shrine of Saint Vitus.

SAKHALIN, *sa ka lyeen'*, an island off the eastern coast of Siberia, owned by Japan. It is 600 miles long and from sixteen to 100 miles wide, its greatest length extending north and south. It is separated from Asia by Sakhalin Gulf and by the Gulf and Strait of Tartary, and from Japan by the Strait of La Pérouse. A mountainous ridge extends throughout the entire length of the island, and the few streams, the largest of which is the Paranay, are short and rapid and abundantly stocked with fish. The soil is

not highly productive, but the dense pine forests are an important resource. Coal and petroleum exist in large quantities, and the fur-bearing animals are numerous. The principal towns are Dui, Korsakova, Rykovskoie, Muravievski and Harukimachi, the seat of government. The population is about 56,500.

Japan acquired the southern half of the island from Russia in 1905, and during the World War the whole island became a part of the Japanese Empire.

SAL'ADIN (1137–1193), a celebrated sultan of Egypt and Syria, who in 1187 caused consternation throughout the Christian world by his capture of Jerusalem. This led to the Third Crusade (see CRUSADES), and the fall of Acre in 1191. Saladin's defeats at the hand of Richard I of England compelled him to conclude a truce, which was followed by the withdrawal of Richard. The following year Saladin died at Damascus. A fine delineation of his character is found in *The Talisman,* by Sir Walter Scott.

SALAMAN'DER, a small lizardlike animal belonging to the same class as the frog and toad (see AMPHIBIANS). It has a long, slender body, a narrow, pointed tail, and

SPOTTED SALAMANDER

four straggling legs which give it the appearance of a tiny alligator. The salamander is found in Europe and North America, except in the extremely cold regions. It lives under stones or logs and in other moist places, and feeds on insects, worms and snails. The spotted salamander of Central and Southern Europe is best known. It is from six to eight inches long, and has a smooth skin with black and yellow markings. The skin is covered with glands which secrete a sticky substance believed by some to be poisonous. A species frequently found in the United States and Mexico has a black, velvety skin. Salamanders breed in the water. The young, called tadpoles, breathe by external gills, which they retain for a long time.

SAL'AMIS, a horseshoe-shaped island of Greece situated in the Gulf of Aegina, about ten miles east of Athens. It has a mountainous surface, but a fertile soil, well adapted to the cultivation of olives and grapes. The area is about thirty-six square miles. The celebrated naval Battle of Salamis was fought here in 480 B. C., in which the Persians under Xerxes were defeated by the Greeks. The chief town is Salamis, or Kuluri. In the World War construction of a new arsenal for the Greek navy was begun here.

SAL AMMONIAC, *a mo'ni ak,* the chloride of ammonium, now generally obtained as a by-product of gas works. The commercial article is in the form of fibrous white crystals. It is used as a remedy for stomach disorders and occasionally in cases of pneumonia. Crude sal ammoniac is used in charging electric batteries, in textile printing, in galvanizing iron and in soldering.

SALARY GRAB, the name popularly applied to an act of the United States Congress, passed in 1873, increasing the salaries of members of Congress, the President, Speaker of the House of Representatives and Associate Justices. The increase in salaries was to take effect from 1871. This back-pay legislation was the feature that gave the act its name, and also caused such a storm of indignation throughout the country that it was repealed in 1874. The increase in salaries was from $5,000 to $10,000, for Senators; from $5,000 to $7,500, for Representatives; from $8,000 to $10,000, for the Vice-President, Speaker and Associate Justices; and from $25,000 to $50,000, for the President. When the law was repealed all salaries except those of the president and the Associate Justices were reduced to their former amounts.

SALAYER, *sah li'er,* **ISLANDS**, or **SALEYER ISLANDS**, a group of about thirty small coral islands in the Indian Ocean, south of the Celebes, forming a part of the Dutch East Indian possessions. Salayer Island, the largest, covers an area of about 250 square miles. The inhabitants are Malays and number about 80,000, nearly all of whom are Mohammedans. The chief exports are ebony, teak, indigo, coffee, cotton and tobacco. The islands are especially noted for their fine breeds of horses.

SA'LEM, MASS., the county seat of Essex County, sixteen miles northeast of Boston, on

Massachusetts Bay, and on the Boston & Maine Railroad, the terminus of six branches. The place was first settled by Roger Conant and his associates in 1626 and is, next to Plymouth, the oldest town in Massachusetts. About 1692 the witchcraft delusion appeared in this district (see WITCHCRAFT). The town was intimately associated with many events of colonial history and contains a number of quaint old houses and irregular streets. It was the birthplace and early home of Nathaniel Hawthorne and the scene of some of the labors of Roger Williams. For many years after the Revolution, Salem was an important commercial center, and its merchants had almost a monopoly of the East Indian and China trade. The harbor, however, was not of sufficient depth, and business began to decline and the foreign trade to be transferred to Boston and New York, about the time of the War of 1812. There is still a considerable coastwise trade.

The industrial establishments are about 180 in number and include large cotton mills, tanneries, shoe factories, lead works, chemical works and other enterprises. Some of the prominent buildings are the Peabody Academy of Sciences, containing large ethnological and natural history collections; the Essex Institute, with its valuable library and historical relics; Salem Athenaeum, a public library; a city hall, a courthouse and a Masonic Temple. There are also several charitable homes for orphans and for the aged of both sexes. The city contains a state normal school, two private secondary schools, and two hospitals. On June 25, 1914, nearly a third of the city was destroyed by fire. Only a few lives were lost, but over 18,000 people were rendered homeless and the money loss was about $10,000,000. Fortunately, the "House of Seven Gables," the Essex Institute and other historic buildings were undamaged. Population, 1910, 43,697; in 1917, 49,346 (Federal estimate).

SALEM, OHIO, in Columbiana County, sixty-five miles southeast of Cleveland, on the Pennsylvania and the Youngstown & Ohio railroads. It is in a rich agricultural and stockraising region, containing deposits of coal. There are engine works, machine shops and manufactories of pumps, stoves, furniture, tools, brick and other articles. The city has two national banks and a state bank, a Carnegie Library and a public hospital. A new high-school building was erected in 1916 at a cost of $250,000. The place was settled in 1806, and was chartered as a city in 1885. Population, 1910, 8,943; in 1917, 9,937 (Federal estimate).

SALEM, ORE., the capital of the state and its second city in size, and the county seat of Marion County, about forty-five miles south of Portland, on the Willamette River and on the Southern Pacific Railroad. It is also connected with Portland by an electric railway. The city is located on ground rising from the river; the streets are wide and beautifully shaded. Prominent buildings are the state capital (see OREGON), a city hall, a courthouse and a Federal building. State institutions are a penitentiary, reform school, school for the blind, school for deaf mutes, institution for the feeble-minded, asylum for the insane and the Government Indian Training School. The city has a business college, a normal school, a Carnegie Library and two public hospitals, Willamette University and a Methodist school. The surrounding country produces fruit, hops and wheat, and the city has manufactures of woolens, flour, loganberry juice, foundry and lumber products, machinery and other articles. Salem was laid out in 1844. Population, 1910, 14,094; in 1917, 21,274 (Federal estimate).

SALEYER, *sa li'ur*, **ISLANDS.** See SALAYER ISLANDS.

SAL'IC LAW one of the laws of the Salian Franks which excluded women from inheriting certain lands, probably because certain military duties were connected with the holding of those lands. In the fourteenth century females were excluded from the throne of France by the application of this law to the succession to the crown, and it is in this sense that the term *salic law* is commonly used. The application of this law to the claim of Edward III of England to the throne of France on the ground that he inherited it from his mother Isabella, daughter of Philip IV, of France, caused his claim to be rejected. See EDWARD III.

SALICYLIC, *sal i sil'ik*, **ACID**, an acid formed by the union of carbon, hydrogen and oxygen in certain proportions, and occurring in the buds of meadowsweet (spirea), wintergreen and birch, and in some chemical substances. When pure it occurs in fine, white, needlelike crystals. It has a sweetish acid taste. Salicylic acid is a powerful antiseptic, and it is extensively used as a preservative. Before its use in the United States

was forbidden by the government (1904) it was employed by packing houses for preserving meat. It is used in the arts in the manufacture of yellow, orange and purple dyes, for strengthening glue, and for preserving hides. Some of its compounds have a limited use in medicine.

SALINA, *sa le'nah*, KAN., the county seat of Saline County, 100 miles west of Topeka, on the Smoky Hill River and on Union Pacific, the Salina Northern, the Missouri Pacific and the Chicago, Rock Island & Pacific railroads. The city is in a fertile agricultural region and contains large grain elevators, flour mills, a brick plant, ice works, a foundry and other establishments. The Kansas Wesleyan University is located here, and the city also has a military academy, a normal school, a business college, a college of music and a Roman Catholic academy for girls. There are a Carnegie Library, a Masonic Temple, a city hall and a courthouse. Salina was settled about 1860, and was chartered as a city in 1870. Population, 1910, 9,688; in 1917, 12,470 (Federal estimate).

SALISBURY, *sawlz'ber e*, N. C., the county seat of Rowan County, on the Southern Railroad, 118 miles west of Raleigh. The city is in a farming and fruit-growing region, and contains railroad shops, cotton mills, hosiery works, concrete roofing factories, veneering works, knitting mills and woodenware and other factories. Livingstone College, a state normal school for colored students, and a normal college for women are located here. A national cemetery contains the graves of more than 12,000 unknown dead. The place was settled by English churchmen from Salisbury, England, and was chartered in 1770. Population, 1910, 7,153; in 1917, about 8,000.

SALISBURY, ROBERT ARTHUR TALBOT GASCOYNE-CECIL, Third Marquis of (1830–1903), an eminent English statesman, was educated at Eton, and at Christ Church, Oxford. He entered Parliament at the age of twenty-three and devoted the remainder of his life to public service. He advanced gradually until in 1866, on the formation of Lord Derby's third administration, he was appointed Secretary of State for India. The following year he resigned that office, but resumed it in the Disraeli government of 1874. He took part in the conference of Constantinople, which was expected to settle the dispute between Russia and Turkey; and at the end of that war, having become Foreign Minister, he insisted that the treaty which Russia had forced from Turkey be submitted to a congress of the powers. In 1878 he accompanied Disraeli to the congress at Berlin, and on the death of that statesman he became the recognized leader of the Conservative party. He became Premier, as well as foreign secretary, on the fall of the Gladstone government in 1885. With the exception of the years 1892 and 1895 Salisbury was at the head of the government from 1886 to 1902. He was regarded as one of the foremost statesmen and diplomats of his time.

SA'LISHAN STOCK, a group of Indian tribes, classed by language, but whose units possess various dialects. They once occupied prominently nearly all of Vancouver Island, and parts of British Columbia, Northwestern Montana and Northern Idaho. There were about eighty tribes. They number at present about 16,000.

SAL'IVA, the transparent watery fluid secreted by glands connected with the mouth. It keeps the mouth moist, and by mixing with the food during mastication makes of it a soft, pulpy mass, that is easily swallowed. It also changes the starchy elements into some kind of sugar. The salivary glands are the *parotid*, on the sides of the throat; the *submaxillary*, under the lower jaw; the *sublingual*, under the tongue, and numerous smaller ones, with separate ducts, which are scattered thickly beneath the mucous membrane of the lips, cheeks, soft palate and root of the tongue. Thorough chewing of the food stimulates the secretion of saliva and helps in the process of digestion (which see).

SALLUST, *sal'ust*, (86–34 B. C.), otherwise CAIUS SALLUSTIUS CRISPUS, was a Roman historian. He became tribune in 52 B. C., and in the civil war was a partisan of Caesar. In 47 B. C. he was made praetor elect, and in the following year accompanied Caesar to the African war, at the conclusion of which he was appointed governor of Numidia. He returned with immense wealth, was accused of maladministration and oppression, but was never brought to trial. In the luxurious retirement of his later years he wrote the *Bellum Catilinarium*, a history of the Catiline conspiracy, and the *Jugurtha*, or *Bellum Jugurthinum*, a history of the war against Jugurtha, king of Numidia, which are valuable rather for literary excellence than historical accuracy.

Leaping a falls

SALMON, *sam'un*, a fish inhabiting salt and fresh waters, and belonging to the same family as the trout and the whitefish. There are about one hundred species, but only five or six are generally known. Salmon inhabit cool water, and are found only in a cool temperate climate. They occur in the largest numbers off the Pacific coast of the United States, British Columbia and Alaska, and in the rivers of these regions. In the northeastern part of the United States, the eastern provinces of Canada and in Norway and Sweden salmon are found which spend their lives in fresh water. These are known as *landlocked* salmon.

Description. The species best known are the quinnat, or king salmon, the blueback, the humpback and the dog salmon. While these species vary in minor points, they all have the same general characteristics. The typical color of the adult fish is a steel blue on the back and head which becomes lighter on the sides and under parts. The king salmon has an average weight of twenty-two pounds, but occasionally one is found weighing 100 pounds. The blueback is of a brighter blue than the king, but not so large, its average weight being about five pounds and its maximum twelve pounds. It may grow to three feet in length, but eighteen or twenty inches is the average size. The flesh of all salmon is of a reddish color, varying from pink to a deep orange. The color varies in the same fish at different times in its life, and the color is no guide to the quality of the flesh, as many suppose.

When it has reached its fifth year, the salmon is mature, and is capable of spawning. Salmon live in the sea until they are ready to spawn, when they ascend rivers to deposit their eggs in fresh water. Sometimes they ascend streams for hundreds of miles, and the strength and skill displayed by them in overcoming obstacles have won the admiration of all observers. Fish have been known to leap fourteen feet into the air and make a curve of twenty feet in ascending a waterfall. If one fails the first time it continues to repeat the effort until it succeeds or becomes exhausted. Those that fail die in a few days.

The male digs a nest from one to five feet deep in the bed of the stream, and in this the female deposits a countless number of eggs. The spawning over, both male and female float down stream, tail first, making no effort to swim, and within ten days they die.

When the young appear they are about an inch long and have a yolk sac attached to the under side. This furnishes all the nourishment for the young fish for the first two months. The young salmon live in fresh water for the first two years. When they move to the sea they are from three to four inches in length and weigh but a few ounces. After reaching salt water they grow rapidly.

Fisheries. The salmon is one of the most valuable food fishes in the world, and the salmon fisheries are exceeded in value only by those of the herring and the oyster. The greatest salmon-fishing centers in the world are on the Pacific coast of the United States and in Alaska and British Columbia. The fish are taken when they ascend the rivers, or usually in the spring. Gill nets, seines, traps or pound nets and fish wheels are employed in catching the fish. The fish trap consists of a series of nets so laid and fastened to stakes driven in the bottom of the stream as to form a winding passage leading to an inclosure from which the fish cannot escape when they have once entered it. Fish wheels resemble the revolving swing, with wire dip nets in place of the seats. The wheel is mounted on a horizontal axis and is so placed that the current keeps it in constant rotation. The nets pick up any fish that comes within their reach, and dump them into a chute down which they slide to a receiving bin. These wheels range from nine to thirty feet in diameter and from five to fifteen feet in width, and cost from $1,500 to $8,000. They are used extensively on the Columbia River. Some of them are attached to scows so they can be moved from place to place. In most of the Alaskan fisheries the trap or pound net is employed.

The fish are cleaned, dressed, cut into pieces and placed in cans, where they are thoroughly cooked by steam before the cans are sealed. In the small fisheries this work is done by hand labor, but in the large estab-

lishments it is all done by machinery. The quinnat, or king salmon, having an average weight of twenty-two pounds, is the species most extensively taken in Alaskan waters, Puget Sound and the Columbia. The blueback is also extensively taken in the same waters. The pack of Alaska salmon in average years is about 5,000,000 cases, valued at $23,000,000 to $25,000,000.

SALOL, *sal'ole,* a compound of phenol and salicylic acid. It is a white powder, odorless and almost tasteless, and soluble in alcohol or ether, but not in water. It is used as a remedy for cholera and jaundice, and a component part of phenacetin, which is employed to relieve the pain of neuralgia and rheumatism.

SALOME, *sa lo'me,* the daughter of Herodias, who caused the death of John the Baptist. The name also is borne by the mother of the apostles James and John and one of Christ's most devout female adherents, who followed him from Galilee in order to minister to him.

SALON, *sa lawN',* THE PARIS, an exhibition of works of living artists held annually in May and June at the two Palaces of the Fine Arts, when the coveted prize of Rome is awarded. Artists from all over the world may send their productions to the jury of experts, which decides on the works to be exhibited as well as upon the prizes and medals to be given. The National Society of Fine Arts, an independent organization, known as the New Salon, holds its annual exhibitions from May to July.

SALONIKI, *sah lo ne'ke,* GREECE, an important seaport, formerly in European Turkey, situated at the head of the Gulf of Saloniki, 315 miles nearly west of Constantinople and 250 miles north of Athens. As a result of the Balkan War Saloniki was incorporated into Greece. The city rises from the sea in the form of an amphitheater, and when seen at a distance presents an unusually striking appearance. It contains numerous ruins of ancient and medieval times, among which is a triumphal arch to Constantine. There are also a number of mosques of some interest, that of Saint Sophia being noted for its fine mosaics. The city was occupied by the allies October 6, 1915, and became an important post in the Balkan campaign (see WORLD WAR). In 1917 the city suffered from a disastrous fire. Population, 1913, about 160,000.

SAL'SIFY. See OYSTER PLANT.

SALT. From the earliest ages salt has been used as a seasoner and preserver of foods, and has borne an important part in the lives of nations. Salt has always been regarded as a symbol of purity and stability. The Israelites were commanded to season their meat offerings to Jehovah with salt, and Jesus called his followers "the salt of the earth." Among certain tribes in the interior of Africa where salt is scarce it is used for money.

The "covenant of salt" could not be broken (*Num.* XVIII, 19). Among Orientals salt is regarded as a symbol of friendship and hospitality. The Arabs have several phrases signifying this meaning. "There is salt between us," signifies friendship; to "eat of a man's salt" is to partake of his hospitality; "to sit above the salt" is to occupy a place of distinction. In Persia the expression "untrue to salt" means disloyalty.

Chemically salt is a compound of chlorine and sodium, and its chemical name is *chloride of sodium;* in mineralogy it is known as *halite.* A certain amount of it is necessary to the life and health of man and of animals.

Where Salt is Found. Salt is found in many parts of the world in one of three forms: in ocean or lake water, in underground brine, and as rock salt. Since all rivers carry some salt the accumulation may become very great when the rivers enter a reservoir which has no outlet. It is in this way that the salt lakes have been formed, and the salt of the ocean has also probably come from the wash of the lands. We must remember that salt is really a mineral, found in the earth; its existence in water is due to solution. In the Caspian Sea the water has only 0.63% salt; the Mediterranean contains 3.37%; the Atlantic Ocean averages 3.63%; the Dead Sea has 22.30 per cent, and Great Salt Lake 23 per cent.

Rock Salt. When the quantity of water evaporated exceeds that entering a natural reservoir, the water becomes saturated, and salt will gradually be deposited on the bottom. The drying-up of lakes or the evaporation of sea water in enclosed bays has thus led to the formation of rock salt deposits. It is from rock salt that most of the world's supply of salt is obtained. Extensive deposits occur in Michigan, New York, Ohio, Kansas, California and Louisiana, and in the province of Ontario, Canada. The deposit on

Avery's Island, near New Iberia, La., covers 144 acres and is of a remarkable degree of purity. Along the Virgin River in Nevada is a bluff twenty-five miles long, over sixty

PRODUCTION IN AVERAGE YEARS
Only those states are named which report over 3,000,000 barrels of salt in a year.

per cent of which is salt of high grade. Extensive deposits occur in the Carpathian Mountains, and some mines there have been worked since the twelfth century. The most celebrated salt mines in the world are at Wieliczka, near Cracow, where streets and houses for the miners have been excavated from the salt. Some of these mines extend over thirty miles, and are a series of vaulted chambers supported on huge pillars of salt.

How Salt is Obtained. The simplest method of obtaining salt is by the evaporation of sea water, but this is seldom done except in countries which have no other source of supply. It consists in conducting sea water into shallow tanks and then evaporating the water by artificial heat or by the sun's rays. Underground brines are extracted by driving wells through which they are pumped to the surface. Rock salt is mined just like any other mineral. When brought to the surface it is either shipped in large lumps or put through a "breaker," or series of crushers, toothed rolls and screens, for breaking up the lumps.

It sometimes happens that rock salt is in such a geological formation that the ordinary mining methods will not do. In this case a well is bored down to the salt deposit in the same manner as an oil well. It is customary to case the well with a pipe; inside of this is put a second tubing, which usually extends to a lower depth than the outer pipe. Water is forced down between the outer and inner tubing. The water at the bottom dissolves the salt, and the solution is forced up through the inner tube. It is also possible to bore several wells, the water being forced down one and the brine up the other. The coarser grades of salt are produced by allowing the water to

Outline on Salt

I. Sources
  (1) Salt water
  (2) Brine springs
  (3) Rock salt
II. Production
  (1) Methods
    (a) Evaporation of sea water
    (b) Boring wells
    (c) Mining
  (2) Chief producers
III. Uses
  (1) Seasoning and preserving
  (2) For chemicals
    (a) Soda
    (b) Chlorine
  (3) Miscellaneous
    (a) Glazing pottery
    (b) Hardening soap
    (c) Making glass clearer
    (d) Fertilizer
IV. Interesting Facts
  (1) References to salt in the Bible
  (2) Meaning among orientals
  (3) Arab phrases
  (4) The Persians' method of expressing disloyalty
  (5) Use of salt for money

Questions on Salt

What is salt?

What process causes the formation of salt deposits?

Where is most of the salt extracted from sea water produced? What is it generally called?

What are the processes of drying? By which process is the best salt produced?

Where in the United States is rock salt found? Where underground springs or wells?

For what has salt been used since the earliest times?

What are some other uses for salt?

Is salt unknown anywhere in the world?

Why are some people called "the salt of the earth"?

How does salt preserve meat and fish?

Where in the United States have large salt works been recently established?

evaporate by the sun's heat, but for the better grades artificial heat at a very high temperature is necessary. A tank is about twenty to twenty-four feet wide, one hundred feet long, and ten to twelve inches deep. The tanks rest on brick arches and the heat is supplied from grates set at one end of the tank and somewhat underneath it. Instead of using grates, hot water or steam pipes are often run under the tank. In another process the brine is poured into large kettles having a capacity of 120 gallons.

In the United States salt is found at various depths. In New York it is mined from beds of rock salt which reach a thickness of 250 feet; the beds outcrop in the central portion of the state and dip southward to a depth of 2,700 feet. In Michigan the beds lie at a depth from 1,600 to 2,200 feet. In Kansas the salt is nearer the surface, seldom being found below 800 feet. Great Salt Lake (which see) has become one of the important sources of salt, and the salt works erected there are among the largest in the world. The output is over 50,000 tons a year.

Michigan and New York are the most important salt states. Ohio and Kansas are next in order.

Uses. There are various grades of salt, each designed for a special purpose. We have table, dairy, common, fine, packers', solar and other grades. The chief use of salt is for preserving and seasoning food, especially in packing meats and fish. It is extensively used in the arts in the manufacture of soda ash and carbonate of soda, for hardening soap, for glazing the coarser grades of pottery, such as jugs and crocks, and for improving the clearness of glass. It is also a source of chlorine, and on some soils it is a valuable fertilizer.

SALTILLO, *sahl teel'yo,* MEXICO, known locally as LEONA VICARIO, in the northeastern part of the country, the capital of the state of Coahuila, about fifty miles southwest of Monterey. Near the town is the site of the Battle of Buena Vista, a leading engagement of Taylor's campaign in the Mexican War. Saltillo is served by the National Railway of Mexico, and in normal times is a prosperous manufacturing city, producing cotton, woolen and knit goods. There is a college, the Madero Institute, a library and several Roman Catholic churches. Population, 1915, about 38,000.

Mormon Temple

SALT LAKE CITY, UTAH, the capital and largest city of the state and the county seat of Salt Lake County, situated twelve miles southeast of Great Salt Lake and 742 miles west of Denver, on the Denver & Rio Grande, the Oregon Short Line, the Western Pacific and the Salt Lake & Los Angeles railroads. The site is a gently undulating plateau, at the foot of the Wasatch Mountains, with an altitude of 4,300 feet above sea level. The city is regularly laid out, with wide, straight streets, and the residential sections are beautified by shade trees, broad lawns and flower gardens about the homes.

Features of Special Interest. The city centers about Mormon Square, or the Temple Block, which covers an area of about ten acres and is the site of the Tabernacle, the Mormon Temple and the Assembly Hall. The Tabernacle is an oval auditorium, 250 feet long, 150 feet wide and 70 feet high, with a seating capacity of nearly 10,000. The roof is supported by arches, and the acoustic properties of the auditorium are such that a person speaking in an ordinary tone of voice can be distinctly heard in any part of the room. At one end are the choir loft and the great organ, considered by many the best instrument of its kind in the United States. The Temple is the most prominent structure in the city. It was nearly forty years in process of erection and cost over $4,000,000. It is of Utah granite, and in its finishings and furnishings the interior is said to be richer than the famous Temple of Solomon. The building is 186 feet long and 99 feet wide, and each end is surmounted by three lofty towers. The highest spire supports a figure of the Mormon angel Moroni. Since its dedication the Temple has been closed to all except Mormons who have lived according to the rules of the Church. It is used for marriages, baptisms and other sacred rites.

In front of the square containing these buildings is a low monument, surmounted by a statue of Brigham Young. The city also contains a number of other small parks, including Liberty, Pioneer, Majestic and Wandamere parks. Chief among the public build-

ings are the county and city building, the new $2,000,000 state capitol, the Salt Lake Theater, the state penitentiary and a number of business blocks. The educational institutions include the University of Utah, a state normal school, All Hallow College (Roman Catholic), the Latter Day Saints' College, and schools maintained by the Congregational, Protestant Episcopal and Presbyterian denominations.

Industry. Salt Lake City is in the center of a rich mining region and has a number of large smelters. The other industrial establishments of importance include car shops, boot and shoe factories, foundries and machine shops and lime and cement works. The city is an important distributing point for the surrounding country and has an extensive trade.

History. Salt Lake City was founded in 1847 by a company of Mormons under the leadership of Brigham Young (see MORMONS). It was organized as a city in 1851 and was given its present name in 1868. After the discovery of gold and silver in the vicinity, Gentiles (those not belonging to the Mormon faith) began to invade the region and settle in the city, and now only about two-thirds of the population are Mormons. From the beginning the city has had a steady and prosperous growth. Population, 1910, 92,777; in 1917, 121,623 (Federal estimate).

SALTON SEA, *sawl'ton,* or **SALTON SINK,** a large body of water occupying a portion of Imperial Valley in Southern California. The valley is the basin of an old inlet from the Gulf of California, and is from 200 to 300 feet below sea level. It is supposed to have been shut off from the gulf by a bar formed of sediment deposited by the Colorado River, whose bed is far above the bottom of the valley. In time the water evaporated and left a large fertile area. This land, however, was useless without water for irrigation. In 1900 a company of American capitalists attempted to supply the valley with water by tapping the Colorado River and constructing a canal. But the slope of the canal was so rapid that the water soon got beyond control, and the Colorado sought the lower level by the shortest course. A lake covering an area of 500 square miles was formed. Millions of dollars worth of property were destroyed, and many people were driven from their homes. By the united efforts of the Southern Pacific Railway and the United States government the breach in the bank of the river was finally closed. In the course of time the waters may disappear through evaporation.

SALTPETER, or **NI'TER,** a compound of potassium and nitric acid, known in chemistry as potassium nitrate and bearing a close resemblance to common salt. It is found native in some earths in the cave region of Kentucky and Tennessee, and in certain localities in Spain, Egypt and India, but most of the saltpeter of commerce is prepared by treating potassium chloride with sodium nitrate.

Saltpeter crystallizes in transparent six-sided prisms. It has a mild, salty taste, and when taken in small quantities produces a cooling effect. For this reason it is sometimes given as medicine in fevers. It is a strong preservative, and is sometimes put in brine for preserving meat. Its most extensive use in the arts is in the manufacture of gunpowder; it is also used in making fireworks and matches; it enters into the composition of a number of fluxes for smelting ores, and is employed to some extent in dyeing.

Chile Saltpeter or **Soda Saltpeter,** is a sodium nitrate. It takes its name from the fact that extensive beds of it are found in Chile and Bolivia. It is extensively used as a fertilizer and in the manufacture of saltpeter. See GUNPOWDER; FERTILIZERS.

SALTS, SMELLING, a preparation of carbonate of ammonia with a sweet-scented volatile oil. See AMMONIA.

SALUTA'TION, formal recognition, by words or gestures, between persons upon meeting. Verbal salutations usually express a wish for the welfare of a person or an inquiry as to his health. Salutations by gesture vary with different peoples. In Western countries people shake hands or kiss each other; the Chinaman shakes his own hands; the Tibetan sticks out his tongue and pulls his right ear; the native New Zealanders rub noses. Subservience is indicated by prostrations, kneeling, military salutes, etc.

Salutations according to rank, as "Your Majesty," "Your Grace," "Your Excellency," were formerly very much in use. These still persist even in democracies, in the title "Reverend" given to clergymen and "Your Honor" addressed to judges.

SALVADOR, *sahl va dawr',* the smallest, most, densely populated and most progressive of the republics of Central America, has an area of 7,225 square miles, making it a little

smaller than the state of New Jersey. The coast line is about 200 miles long and deeply indented, so that it contains a number of good harbors. Along the coast there is a low plain about fifteen miles wide, but the interior of the country is traversed by mountain groups and has a decidedly wild appearance. A number of the peaks are volcanoes, the highest having an altitude of about 8,000 feet. Izalgo has been active almost continuously for more than 100 years. The rivers are few, the most important being the Lempe, which rises in Lake Guijar and flows southeast and forms a part of the boundary between Salvador and Honduras.

Climate. The climate along the coast and in the valley is hot and in many places unhealthful, but in the interior, among the hills and mountains, it is equable and healthful. There is an abundant rainfall.

Products and Commerce. The soil is usually fertile and most of the country is in a state of cultivation. The principal crop is coffee, the annual crop of which averages over 55,000,000 pounds, valued at about $6,500,000. Other important products are cotton, tobacco, sugar cane and rubber. Gold, silver, copper, iron and quicksilver are found, and there are numerous mines in operation. There are no manufactures. A line of railway connects Acajutla, Santa Ana and Libertad, and another connects San Salvador with Santa Ana. Aside from this, inland transportation is by draft or pack animals.

People and Government. Three-fourths of the people are of mixed white and Indian blood, and are called Ladinos, or Mestizos; there are a few whites, and the remainder are Indians. Education is free and compulsory. Elementary schools are found in all parts of the country; there are numerous higher schools and a national university. Most of the inhabitants are members of the Roman Catholic Church but there is freedom in religious belief.

The government is republican in form, the executive consisting of a president and the legislative power being vested in a single chamber. The president is chosen for four years and is assisted by a cabinet of four members. For the purpose of local government the state is divided into fourteen departments. Salvador was formerly a possession of Spain, but it revolted in 1821 and joined the Mexican Confederation. Two years later it withdrew from this confederation and subsequently formed part of the Republic of Central America. In 1853 it became an independent republic.

Progress has been delayed by wars with neighboring states and by revolutions and counter revolutions at home. Yet the economic development and stability of Salvador are far in advance of those of the other Central American states. A disastrous earthquake occurred in the spring of 1919, causing great loss of life and property. The capital and chief city is Salvador (which see). The other cities of importance are the seaports of La Libertad and Acajutla. Population, 1916, estimated, 1,271,300. See CENTRAL AMERICA.

SALVA'TION ARMY, one of the most influential religious bodies in the world. It is organized on a semi-military plan and has for its purpose the bringing of spiritual and material benefit to those whom the Churches do not reach. The organization is the outgrowth of a mission begun in East London by "General" William Booth, in 1864. Booth was a Methodist minister, and finding that the Church did not sympathize with his work among the poor, he began holding independent meetings in an unused graveyard, and organized what was first known as the Christian Mission. The present name was adopted in 1878. With the name *army* came military phraseology. Prayer was called knee-drill; the leader, a general; evangelists, officers and candidates, cadets. A semi-military attire was assumed, and barracks were built. Total abstinence is a condition of membership. The object is to attract people who would not enter church or chapel, and for this cause public houses and prisons are visited, and open air meetings are held. Since its organization the work of the Salvation Army has been expanded to include many kinds of activity, all of which are carried on under two general departments—the evangelistic and the department of social relief. The evangelistic work lies at the foundation of all other activities. In their meetings the Gospel is preached in such simple language than even those unable to read can understand the message, and strong spiritual and moral influences are brought to bear directly upon the individual.

The department of social relief maintains slum settlements, which have been likened to "lighthouses on a dark and rocky coast;" establishes rescue homes for the reclamation of fallen women, and industrial homes where

homeless and otherwise unemployed men are given work until they can find employment. Workingmen's hotels, where a poor man may find a clean bed amid wholesome surroundings, are maintained in all large cities, and free employment bureaus find work for those who need it.

Young women's boarding homes do for girls on a moderate salary what the hotels do for the men, and in addition provide homelike surroundings and enjoyable and wholesome entertainment. Other lines of work include homes for the care and training of orphan children, the giving of Christmas dinners to the poor, giving assistance to the families of prisoners and released prisoners, and the maintenance of schools for the training of Army officers and workers.

Organizations of the Salvation Army are found in forty-nine countries, and in 1919 they maintained 9,647 posts and 1,231 social institutions.

Work in the World War. Within ten days of the beginning of hostilities in 1914, the commander of the Salvation Army in England offered the services and resources of the organization to help the soldiers at the front, and a small body of workers was immediately sent to France. This number was gradually increased to a force of over 2,000, thoroughly organized and equipped for service. The American branch moved with equal rapidity. The week that war was declared the forces and resources of the Salvation Army in the United States were offered to the government, and one of its leading officers accompanied the first detachment of troops sent abroad. Others followed at short intervals, until a strong force from the American branch was in the field.

Because of their military organization and discipline, the members of the Salvation Army could more easily adapt themselves to army requirements and conditions than could the members of most other auxiliary organizations. They wasted no time on non-essentials, but seized upon every condition and circumstance possible that would enable them to carry comfort, cheer and any form of assistance to the soldiers at the front. The Salvation "lassies" were the only women admitted to the trenches, and there many of them shared the hardships and dangers of the men, serving coffee and food and caring for the wounded. In addition to this they remained for hours at a time under fire, dressing the wounds of those who were injured. They established huts for social and religious gatherings and for dispensing refreshments, and maintained an ambulance and hospital service. Soldiers give praise without limit to the heroic men and women who rose to their great opportunity in the time of the world's greatest need. See BOOTH (family).

SALVINI, *Sahl ve'ne,* TOMMASO (1829-1916), a famous Italian tragedian, was born at Milan. His parents were actors, and at fourteen the boy began a stage career. In four years he was playing leading rôles with Ristori. In 1849 he entered the army to fight for Italian independence, and rendered conspicuous service. After the war he returned to the stage and won praise for his performances of great classic rôles. In 1868 he organized a company with which he made many tours of Europe and America. He never learned English, but spoke his parts in Italian, even when the rest of the play was spoken in English before English audiences, yet he retained his popularity. He retired in 1890 to his home at Florence.

SAMA'RIA, a city of Palestine and the capital of the northern kingdom of Israel. It was built by Omri and named for Shemer, the original owner of the site (*I Kings,* XVI, 24), and was captured by the Assyrians about 722 B. C. In the second century B. C. it was entirely destroyed, but it was rebuilt by Herod the Great, who named it Sebaste. The small village of Sebastiyeh now occupies a part of the site.

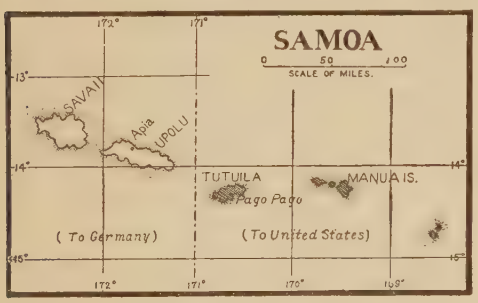
SAMARITANS, the name applied to the inhabitants of the region between Judea and Galilee in Palestine. They were a mixed people consisting of remnants of the tribes of Manasseh and Ephraim and Assyrian colonists who were brought by the king of Assyria to take the place of departed Jews after the fall of the northern kingdom. The Samaritans were strict adherents of the law of Moses, but they were regarded by the Jews as heretics, because they did not accept other parts of the Old Testament.

When the Jews returned to Jerusalem from the captivity the Samaritans wanted to assist in rebuilding the Temple, but the Jews rejected their offer with scorn. The Samaritans built a temple on Mount Gerizim, and during the time of Christ the Jews and Samaritans had no dealings with each other. During the subsequent rule of the Romans over Palestine the Samaritans were scattered.

SAMARKAND, *sam ar kant',* RUSSIAN TURKESTAN, is situated on the Transcaspian Railway, 140 miles east of Bokhara. The city is divided into the native, or old, quarters and the Russian, or modern, quarters. In the native quarters is a large central square. This part of the city has narrow streets and contains a number of mosques and bazaars. The Russian quarter dates from 1871 and is constructed on a more modern plan. The city contains the tomb of Tamerlane, who formerly ruled a vast empire of which Samarkand was the center. Samarkand has a good trade in cotton, rice, silk, gold and silver wares, pottery and wines. Population, 1910, about 90,000.

SAM'NITES, several ancient tribes of Lower Italy, of Sabine stock. They were a brave, frugal and religious people, who were brought under complete subjugation by the Romans after wars waged with few interruptions for fifty-three years. When the Italian allies of Rome revolted in 900 B. C., the Samnites again fought desperately against their oppressors, but were entirely subdued by Sulla, and the tribes were almost exterminated.

SAMO'A or **SAMOAN ISLANDS,** formerly called NAVIGATOR'S ISLANDS, a group of islands in the Pacific Ocean, situated between 13° 25′ and 14° 30′ south latitude and between 168° and 173° west longitude. They are



4,300 miles southwest of San Francisco and 2,400 miles northeast of Sydney, Australia. The islands are fourteen in number, and are of volcanic origin. Their total area is about 1,100 square miles, and their population is about 39,000. The islands are decidedly mountainous and contain volcanic cones which rise to over 5,500 feet. The vegetation is of a tropical nature and is luxuriant. The climate, though hot, is healthful, but the islands are subject to violent hurricanes. One of the most disastrous, in 1889, caused widespread destruction of property and life.

Before the World War these islands were under the control of Germany and the United States, but in 1914 a British force from New

Zealand occupied Apia, on the German island of Upolu, and within a short time New Zealand extended its control over all of German Samoa. The only islands of importance are Savaii, 660 square miles in area, Upolu, 340 square miles, and Tutuila with seventy-seven square miles and a population of 7,250. Tutuila is under the administration of the United States, which maintains a garrison at Pago Pago, the only good harbor in the islands. Savaii was German territory at the outbreak of the war. Robert Louis Stevenson lived on Upolu for years, and his grave is on a hillside overlooking Apia. The natives are the best type of the Malay race, and are industrious, kind and hospitable.

SA'MOS, *sa'mahs,* one of the principal islands of the Aegean Sea, separated from Asia Minor by a narrow strait. The area is about 289 square miles and its population, almost entirely Greek, is 65,000. It is traversed by a mountain range. Its fertile lowlands yield an abundance of raisins, fruits, mastic, corn, oil and Muscadine wine. The island also contains valuable marble quarries. It was a possession of Turkey before the World War.

SAMOTHRACE, VICTORY OF. See subhead, under SCULPTURE.

SAMP'SON, WILLIAM THOMAS (1840-1902), an American naval officer, born at Palmyra, N. Y. At the age of seventeen he was appointed a midshipman in the United States Naval Academy at Annapolis, graduated at the head of his class in 1861 and was immediately ushered into service. In 1866 he was promoted to be lieutenant-commander, while on the *Colorado.* From 1868 to 1871 he was instructor at the Naval Academy, and again from 1876 to 1879; and from 1886 to 1890 he was its superintendent. From 1893 to 1897 he was chief of the bureau of ord-

nance, and had much to do with the building up of the navy.

Sampson was president of the court of inquiry to investigate the destruction of the Maine, and at the outbreak of the Spanish - American War was made acting rear-admiral and given command of the fleet off the coast of Cuba. He planned the blockade of Santiago harbor, but while he was away conferring with General Shafter in command of the land forces, the Spanish fleet attempted to escape. It was attacked and destroyed by the American fleet under the command of Commodore Winfield Scott Schley.

WILLIAM THOMAS SAMPSON

After the war Sampson was raised to the rank of rear-admiral, and given charge of the Charlestown Navy Yard. He retired in 1902 and died soon after. See SCHLEY, WINFIELD SCOTT.

SAMSON, "the Jewish Hercules," was a judge in Israel, and was famed for his great strength. His story is told in the book of *Judges*, chapters XIII to XVII. Before his birth his mother was commanded by an angel to bring him up as a Nazarite. That meant he was not to drink wine or cut his hair. He was a popular hero and an inveterate enemy of the Philistines. His peculiar gift of great bodily strength is strikingly shown in the nature of his deeds; he tore in pieces a lion; broke his bonds asunder and carried away the gates of Gaza, and slew a thousand Philistines with the jawbone of an ass. A Philistine woman, Delilah, with whom he fell in love, coaxed from him the secret that the source of his great strength was his long hair, and when he was asleep she cut his hair, and deprived him of his strength. He was then captured by the Philistines, who put out his eyes and cast him into prison. Later, at the great feast of Dagon, Samson was taken from prison to amuse the Philistines, but his hair had grown and his strength had returned, and he pulled down the building over the Philistines and perished with them. Milton made his death the subject of the drama *Samson Agonistes*. The opera *Samson and Delilah*, by Saint-Saëns, is also based upon incidents in his life.

SAMUEL, the first of the order of prophets after Moses and the last of the judges of Israel. He was consecrated by his mother, Hannah, to the service of Jehovah, and was brought up in the Temple under the direction of Eli, the high priest. He assumed the judgeship about twenty years after the death of Eli. His administration was distinguished by the restoration of the worship of Jehovah, the defeat of the Philistines and the induction into office of Saul, the first king of Israel, whom God directed Samuel to annoint. When Saul failed in his duties, God directed Samuel to annoint David. Samuel did not live to see the end of the contest between Saul and David. See BIBLE, subhead *Bible Stories*.

Samuel, Books of, two books of the Old Testament immediately following *Judges*. They contain the history of Israel during the administration of Samuel and the reigns of Saul and David. The books were originally one, and were named for Samuel because of the prominent part he took in the history of the period. The author is unknown.

SAMURAI, *sah moo ri'*, a Japanese word meaning *guard*, defines a military caste in Japan during the feudal régime. It included the shogun, or commander in chief, the daimios, or feudal landowners, and the followers or retainers of the latter, besides a part of the middle class. When the feudal system was overthrown in 1871, the daimios and their followers were given pensions, in return for the cession of their lands to the emperor, and the daimios were thereafter known as *nobility*, while all the members of the samurai were given the title of *gentry*.

SAN AN'GELO, TEX., the county seat of Tom Green County, situated on the unnavigable Concho River, and on the Gulf, Colorado & Santa Fé and the Kansas City, Midland & Orient railroads. The city is an important shipping point for cattle and produce. It has machine shops, railroad repair shops, an oil mill, cotton gins, lumber yards and other industries. A motorized fire department is maintained. The commission form of government was adopted in 1915. Population, 1910, 10,321; in 1917, about 15,000 (local estimate).

SAN ANTO'NIO, TEX., the second largest city of Texas, only a little smaller than Dallas. It is the county seat of Bexar

County, eighty miles southwest of Austin, on the San Antonio River and on the Southern Pacific, the International & Great Northern, the Missouri, Kansas & Texas, the San Antonio & Aransas Pass, the Southern Pacific, the Gulf Shore, and the San Antonio, Uvalde & Gulf railroads. The city has an altitude of about 650 feet and has a dry, healthful climate. There are, in all, about twenty parks and plazas. Near the city is Fort Sam Houston, covering about 250 acres, which is one of the largest army posts in the United States and is the headquarters of the Department of Texas. San Antonio is a popular resort for tourists and health seekers, especially for those afflicted with pulmonary diseases.

The educational institutions consist of a large Carnegie Library, nearly fifty private schools and colleges, including the Saint Louis College, Santa Anna Female College, Thomas School, Peacock's School for Boys, Saint Mary's Hall, West Texas Military Academy and Mrs. Mulholland's School for Girls. Among the charitable institutions are the Santa Rosa Hospital, Physicians' and Surgeons' Hospital and the Southwestern Insane Asylum. Other prominent buildings are a courthouse, a city hall, a Federal building, a market house, Convention Hall, San Fernando Cathedral, Saint Mark's Cathedral, two hotels costing nearly $1,000,000 each, several metropolitan office buildings and those occupied by about twenty banks. There is a valuable trade in cotton and live stock. The industrial establishment, over 350 in number, include machine shops, foundries, flour mills, cement works, binderies, cotton presses and other works.

San Antonio was probably first settled in the latter part of the seventeenth century. In 1718 the missions of San Antonio de Valero and of San Antonio de Bexar were founded. In 1731 a colony of people arrived from the Canary Islands. The place was then known as the Villa of San Fernando de Bexar, and this villa was made a city in 1809. The Texan patriot army occupied the place in December, 1835. On the sixth of the next March the famous storming of the Alamo occurred, when the entire garrison were massacred and their bodies burned by the Mexican dictator, Santa Anna. After the decisive victory for the Texans in the Battle of San Jacinto, American pioneers came in greater numbers, and they were followed the next decade by Germans. The first railroad reached the city in 1878, and since then its growth has been rapid. The commission form of government was adopted in 1913. Population, 1910, 96,-614; in 1917, 128,215 (Federal estimate).

SAN BERNARDINO, *ber nahr de'no,* CALIF., the county seat of San Bernardino County, situated in a beautiful valley of the San Bernardino Mountains, sixty miles east of Los Angeles, on the Southern Pacific, the Santa Fé, the Los Angeles & Salt Lake and several lines of electric railways. The abundant tropical vegetation of the valley is in marked contrast to the barren desert which surrounds it. San Bernardino is in the orange belt of California, locally called the "Orange Empire," and packing, preserving and shipping fruit are among its important industries. The Orange Fair, held here annually, has attained a national reputation. The city contains hot water, sulphur and mud baths, has an equable climate and is a popular health resort. A state hospital for the insane is located here, and the city has the Saint Bernardine of Sienna Academy and a business college. The important public buildings are the courthouse, the hall of records, seven churches, the hotels and several banks. The industrial establishments are railroad shops, lumber mills, grain elevators, machine shops and other factories. The place was settled by a company of Mormons in 1851. Population in 1910, 12,779; in 1917, 17,616 (Federal estimate).

SAND, fine particles of quartz and feldspar loosely mixed together. Most sand has been formed by the wearing away of rock, especially sandstone, and sand is being made wherever the wind and waves beat upon any rock containing quartz and feldspar. Pure quartz sands are very valuable for the manufacture of glass, for making mortar, for use as filters, for lightening dense clay soils, for making molds in founding and for many other purposes. Some sands contain metals, and such valuable ores as gold, platinum, tin, copper, iron and titanium often occur in sand. There are many miles of sand along the sea shore and in some inland localities, such as Dune Park, Indiana, along Lake Michigan, it is piled into hills resembling small mountains. See SANDSTONE.

SAND, GEORGE (1804-1876), the pen name of a celebrated French novelist and playwright, ARMANTINE LUCILE AURORE DUPIN, Baroness Dudevant. She was born in Paris. Her first literary venture was a novel, written

in conjunction with a young lawyer, Jules Sandeau, and published under the pseudonym "Jules Sand." From this she took her own pen name. Her published works comprise over sixty novels, numerous plays and several volumes of memoirs. George Sand embraced radical views on social questions and flitted with surprising quickness from one love affair to another. Among her novels may be mentioned *Consuelo, Monsieur Sylvestre, The Snow Man, The Marquis of Villemer* and *Flamaraude.*

SAN'DALWOOD, a fragrant wood of several species of trees native to the East Indies and the Malayan and Polynesian islands. Its wood is manufactured into glove boxes and other articles of ornamental nature. It is largely used as incense in worship by Brahmans and Buddhists. There are several species which furnish sandalwood, the common being the white sandalwood, which comes from the mountains in south India and the islands of the Indian Ocean. Sandalwood oil, after distillation, is used in perfume and for medicinal purposes. Sandalwood chests repel insects.

SAND BUR, or **BUR GRASS**, a prickly weed found in sandy regions in all countries. The stems are from one to two feet long, and bear spikes of ten to twenty burs, which cause painful wounds when imbedded in the flesh. The sand bur is particularly injurious to sheep, since so many burs may become entangled in the wool that the fleece cannot be used. If they reach the skin they cause wounds that affect the health of the animal.

SAND EEL, or **SAND LANCE**, a group of fishes characterized by long, slender cylindrical bodies resembling that of an eel. They vary from four inches to a foot in length, are of a beautiful silvery luster, are destitute of ventral fins, and their scales are so small that they can scarcely be seen. Sand eels swim in schools near the shore and bury themselves in the sand. They are found along the coast of North America from Labrador to New York, and are largely used as bait for cod.

SAND'ERLING, a bird resembling the common sandpiper, but differing from it in that it lacks the hind toe. It breeds in the Arctic regions of both hemispheres and migrates to the southern sections of South America and Africa, but many winter in the Southern states. The feathers of the head and neck are gray, edged with lighter color and spotted with brown, and the lower parts are white. These birds are found along the seacoast, especially during the migrating season, running in the surf.

SAN DIEGO, *sahn de a'go*, CALIF., the county seat of San Diego County, is situated on San Diego Bay, the only land-locked harbor between Panama and San Francisco, 125 miles southeast of Los Angeles and on the Santa Fé and the San Diego & Arizona railways. Its excellent harbor makes San Diego the home port of a number of steamship lines operating between the Pacific coast of the United States and foreign countries. The city is beautifully located on ground sloping towards the bay, and is modern in every respect. The streets are broad, and are ornamented with shade trees, and there are several parks, among them the Plaza, in the center of the business part of the city, and Balboa Park, containing 1,400 acres. This park occupies both sides of a dry valley, and it was here that the Panama-California Exposition was held in 1915. The permanent buildings erected for this exposition add much to the beauty of the park and of the city.

Among the important buildings are a Federal building, a courthouse, U. S. Grant and San Diego hotels, a high school, a normal school, a Carnegie Library, a Masonic Temple and several churches. The city also contains the San Diego Army and Navy Academy, the Philosophical School, a Federal aviation school and a number of private schools. Hotel del Coronado, on a neck of land protecting the harbor, with its Japanese gardens and Tent City, is a widely-known winter resort. On Point Loma, which is owned by the United States, are Fort Rosecrans, a coaling station and quarantine and wireless stations.

The city has a large export and import trade. The leading industries are connected with marketing citrus fruits, the manufacture of fruit and meat products and canning sardines and tuna fish.

A mission was started here in 1769, and the Spanish town was organized in 1835. The place was taken by Commodore Stockton in the name of the United States in 1846. He established a fort, which is still known as Fort Stockton. The present city has grown chiefly since 1867. Population in 1910, 39,578; in 1917 (Federal estimate), 56,112.

SAND'PAPER, a material for smoothing and polishing, made of a stout paper coated with sharp sand embedded in glue. It is

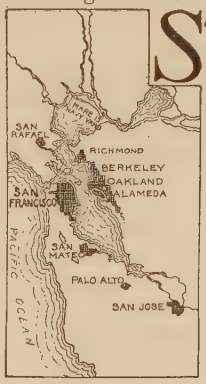
intermediate between glass paper and emery paper in its action on metals, and is less effective than glass paper on wood. Steel wool is now largely used as a substitute for sandpaper.

SAND'PIPER, a small snipe, of which there are about thirty species, found in all parts of the world. They live on the shores of the sea and on the banks of rivers, and seek their food by thrusting their long bills into the soft mud for worms and small mollusks. In winter they migrate to the South in flocks, changing their plumage with the change of seasons. The voice of sandpipers is shrill, but cheery. The eggs, usually three or four, are drab, olive, or buff, heavily spotted with dark brown. The *pectoral sandpiper,* called also the *jacksnipe;* the *purple sandpiper,* and the *spotted sandpiper,* or *teetertail,* are the most common of the species of the United States.

SANDSTONE, a rock composed of grains of sand, cemented together by some other mineral. The cementing mineral may be limestone, clay, oxide of iron or silica. Sandstone is abundant in many localities. It is found in the valley of the Connecticut River, in northern New York, in sections of Ohio, Michigan and Iowa and in many other places. It varies in color from light gray and bluish-gray to dark brown. That found near Cleveland, Ohio, is gray; that near Potsdam, N. Y., a dark red. Sandstone is used for a variety of purposes. Certain fine-grained sandstone makes excellent grindstones and whetstones. Some varieties are soft when quarried, but harden on exposure to the air. The rock is easily quarried and worked, and forms one of the most valuable building stones. The famous "brown stone fronts," formerly so fashionable in large cities, were of sandstone.

SANDUS'KY, Ohio, the county seat of Erie County, fifty-five miles west of Cleveland, on Lake Erie, at the mouth of the Sandusky River, and on the New York Central, the Pennsylvania, the Baltimore & Ohio, the Cleveland, Cincinnati, Chicago & Saint Louis and the Lake Erie & Western railroads. There are also electric railways to Cleveland and other places. The city has an excellent harbor and a considerable trade with other lake ports. The surrounding region is fertile and produces fruits, vegetables and grain. Grapes are extensively cultivated, and fishing is also an important industry. The principal manufactories are basket and crate works, strawboard, crayons, iron and steel products, cooper shops, wagon and carriage factories, shipbuilding yards, machine shops and flour mills. There are also large coal and lumber yards. The state soldiers' and sailors' home is located here. Some of the prominent structures are a Federal building, a courthouse, a county infirmary, a jail, a Carnegie library and two hospitals. Cedar Point and Put-in-Bay, a few miles into Lake Erie, are popular summer resorts. Sandusky was settled in 1817, and was incorporated as a city in 1845. The commission form of government was adopted in 1915. Population, 1910, 19,989; in 1917, 20,226 (Federal estimate).

SANDY HOOK, a narrow peninsula, which projects northward from the coast of New Jersey and partly encloses New York Bay. It is about six miles long and is low and sandy. Near its northern end are the United States military post Fort Hancock and a lighthouse.



SAN FRANCISCO, *san fran sis'ko,* Calif., the chief seaport of the Pacific coast, is situated on the peninsula between San Francisco Bay and the Pacific Ocean, which extends to the Golden Gate, on the north. The city is about seven miles square and comprises the County of San Francisco. It is laid out on hills, which are separated by nearly parallel valleys, and presents a most picturesque appearance, whether seen from the ocean or the bay. It has broad streets and boulevards and many beautiful trees. The residence section is filled with fine mansions, especially along the high ridge, which is parallel to the bay, extending toward the Golden Gate. Along the ocean is a high ridge of sand dunes, which serve to protect the city from the winds.

Plan of the City. Market Street, the principal thoroughfare, extends from the Ferry Building southwest to the vicinity of Twin Peaks, and divides the city into two nearly equal divisions. South of Market Street is the older part of the city, frequently known as the *Mission,* because a Spanish mission was founded in the locality. The two districts are usually known as *North of Market Street*

and *South of Market Street.* The north district contains the chief residence portion and the retail stores of the higher class, while the wholesale houses and manufactories are in the south district. North of Market Street the streets run north and south and east and west, but south of it they run diagonally.

Nearly all lines of business and transportation radiate from the Ferry Building, on the water front. This is a commodious structure 650 feet long, with a large tower rising from the center. All ferries from across the bay land here, and there are over 170 arrivals and departures of ferry boats every twenty-four hours. The California Development Board and the State Mining Bureau have their headquarters here, and the second floor contains an extensive exhibit of the agricultural and mineral resources of the state. North and south of the Ferry Building are extensive docks, at which may be found ships from all parts of the world.

Street cars run from the Ferry Building to all parts of the city. The retail district is on Market Street and adjoining portions of Geary, Kearney, Post and Sutter streets. At the intersection of Geary, Kearney and Market streets is the chief business center; Lotta's Fountain ornaments the small square formed by the intersection of these streets. Surrounding this square and within a short distance from it are many of the large buildings, including the United States Subtreasury, San Francisco Stock Exchange and the building of the Standard Oil Company. In Union Square, two blocks west, is a monument to Admiral Dewey. Other buildings of importance include the Federal Building, a granite structure which survived the fire; the Hobart Building, on Market Street; the Pacific Building, near the ferry; the Humboldt Savings Bank Building; the Mutual Savings Bank Building; the Merchants' Exchange, and the Chronicle and Hearst buildings. Among the most noted structures of the city are its three great hotels—the Palace, on Market Street; the Saint Francis, facing Union Square, and the Fairmont, overlooking the city from Nob Hill. The Civic Center at Market Street; the Saint Francis, facing rounded by a group of magnificient public buildings—the city hall, the municipal auditorium, the opera house, the museum and the public library.

Chinatown. Within the heart of San Francisco, occupying ten city blocks, is a foreign city, Chinatown, in which no whites dwell. Although the old Chinatown was destroyed in the fire of 1906, and was rebuilt on a modern plan, "the Chinaman has not changed many of his spots," and here may be seen the customs, rites and daily life of the Chinese very much as it is lived in China.

Parks and Boulevards. "Undoubtedly, the chief glory of the city is its Golden Gate Park," writes one of San Francisco's most enthusiastic admirers. This park is a half mile wide, and extends inland for four miles, having an area of 1,013 acres. It is one of the largest city parks in the country. It contains many beautiful drives and walks, winding among shady trees, flowers, streams and quiet pools. Numerous tennis courts, baseball diamonds and a stadium provide opportunity for athletic sports, and in the museum and art gallery are valuable collections of antiques, zoölogical specimens and paintings and statuary. Lincoln Park, in the northwest part of the city, is on elevated ground, and affords a fine view of the entrance to the harbor. The Presidio, a military reserve and training ground, joins it on the east, and east of the Presidio is Fort Mason.

The city is favored by having an extensive beach on the ocean front, and this is much used for bathing. At the north end of the beach stands the Cliff House, built on a projecting ledge of rocks and near the Seal Rocks, frequented by sea lions. The Beach Boulevard, beginning at the Cliff House and extending southward for miles, is one of the chief highways of the city. On a hill overlooking the Cliff House are the Sutro museum and gardens, noted for their baths and statuary.

Education. The public high schools are accredited by the University of California and the Leland Stanford Jr. University. The other leading educational institutions include the High School of Commerce, the Normal School, Cogswell Polytechnic College, Wilmerding School of Industrial Arts, the California School of Mechanical Arts, the Lux School of Industrial Training for Girls, and the Conservatory of Music.

Commerce and Industry. San Francisco is the principal seaport of the Pacific coast. Its harbor is one of the best in the world, and throughout the year it contains ships of all nations. The annual foreign trade exceeds $100,000,000 in value. Transcontinental railway lines, which terminate at Oakland, Al-

ameda and Richmond and are connected with the city by ferry, also afford ample railway facilities for inland transportation. The city contains a large number of wholesale and commission houses.

The city is one of the largest manufacturing centers of the country. Among the leading industries are sugar refining, meat packing, canning and preserving fruit, and the manufacture of machinery, glass and chocolate. San Francisco has one of the largest dry docks in the country, and several large shipyards in and near the city give employment to thousands of men.

History. San Francisco Bay was discovered by Portala in 1769, and a mission was established by the Franciscan friars in 1776. Soon after, the Spanish government stationed a garrison here. There was but little growth in the settlement until after the discovery of gold in 1848. With the influx of people consequent upon this discovery, San Francisco suddenly sprang into prominence and has continued to increase in numbers and commercial importance ever since.

On April 18, 1906, an earthquake shock was followed by a fire which in three days devastated four square miles in the heart of the city. The damage to property exceeded $200,000,000, and 450 people lost their lives. Plans were at once perfected for rebuilding the city on a greatly-improved plan, and in less than ten years the devastated part of the city was rehabilitated with substantial steel-frame buildings. The Panama-Pacific International Exposition was held in San Francisco in 1915, and this brought thousands of people to the city from all parts of the world.

Population. The population of San Francisco is remarkable for its cosmopolitan character, and like the populations of New York and Chicago, it contains representatives of almost every nationality in the world. In 1900 the city had 342,000 inhabitants, and it grew rapidly until 1906, when the earthquake and fire caused a loss of about 100,000. However, a majority of those who left soon returned, and others have come, so the city has regained more than it lost. Population, 1910, 416,912. The government estimate of July 1, 1918, gave the city 478,530 inhabitants. It is second only to Los Angeles among Californian cities.

SAN FRANCIS'CO, or **SAO FRANCIS'CO,** a large river of Brazil, 1,200 miles in length, rising in the state of Minas Geraes. It flows north northeast, then east, separating the state of Bahia from Pernambuco, and enters the Atlantic Ocean by two months.

SANHE'DRIN, the chief council of the Jews, originally having power over religious, criminal and civil cases. After the Romans assumed control of Palestine, however, their power was restricted to religious matters. At the time of Christ the Sanhedrin was composed of seventy-one members. It met daily in the Temple and was presided over by the high priest. Only Israelites of good character and well versed in the law could become members. The Sanhedrin tried Christ, and Stephen, Paul, Peter and John were brought before it on charges of heresy. After the fall of Jerusalem in A. D. 70 it disappeared.

SANITARY SCIENCE, that branch of science which deals with the maintenance of health and the prevention of disease by the regulation of external conditions. It treats especially of what is required of each individual, in his duty to his neighbor, so that by using such means as may insure his own health he may help preserve that of his neighbor. Food, personal hygiene, ventilation, drainage, quarantine and many other topics having to do with the maintenance of health are directly related to the general subject of sanitary science.

Related Articles. The various phases of this subject are fully treated in these volumes under the following headings:

Adulteration
Antiseptic
Aqueduct
Bacteria and Bacteriology
Bath
Breathing
Domestic Science
Drainage
Filter
Fly
Food
Fumigation
Garbage
Germ Theory of Disease
Heating and Ventilation
Hygiene
Inoculation
Medicine
Mosquito
Physical Culture
Quarantine
Serum Therapy
Sewage and Sewerage
Tenement
Vaccination
Water

SAN JACINTO, *sahn ja sin'toh,* BATTLE OF, the final engagement in the war for Texan independence, fought near San Jacinto Bay, Texas, April 21, 1836, between a force of about 750 Texans, under General Houston, and a Mexican force of 1,400, under General Santa Anna. The engagement was brief but fierce, a determined charge by the Texan force completely overwhelming the Mexicans. Santa Anna was taken prisoner, and Texas soon set up an independent government. See TEXAS, subhead *History.*

SAN JOAQUIN, *ho ah keen'*, a river of California having its source in a glacier in the Sierra Nevada Mountains, in the southwestern part of the state. It flows southwest, then northwest, and joins the Sacramento just before that stream enters Suisun Bay. Its length is about 350 miles; it is navigable to Stockton throughout the year, and during high water about 200 miles farther for small boats. The San Joaquin Valley is one of the most fertile regions in California.

SAN JOSE, *ho za'*, COSTA RICA, the capital of the republic of Costa Rica, is situated about forty-four miles east of Punta Arenas, a port of the Pacific, and sixty-eight miles west of Limon, on the Atlantic coast. It is on a line of railway connecting these ports. The town is well built, has wide, paved streets and electric lights. The most prominent buildings are the cathedral, the national museum, a school of law, the national library and the Institute of Physical Geography.

San José is situated about 3,800 feet above sea level, has a healthful climate and a pure water supply and is the center of a rich agricultural region. It was founded in 1738 and was made the capital of the country on the establishing of independence in 1823. Population, 1918, 35,657.

SAN JOSE, CALIF., the county seat of Santa Clara County, nearly fifty miles southeast of San Francisco, on the Guadalupe River, seven miles from San Francisco Bay, and on three lines of the Southern Pacific Railroad. The city is located in the beautiful Santa Clara valley, and is a popular health resort. It is the seat of the University of the Pacific, the College of Notre Dame and a state normal school. Other prominent buildings are a city hall, a courthouse, a hall of records, a postoffice, a large hotel and five bank buildings. The city also has two libraries and two public parks. The Lick Observatory is on Mount Hamilton, eighteen miles to the west. Alum Rock Park, with its mineral springs and natatorium, seven miles distant, is also of interest. Large quantities of fruit and grain are raised in the valley, and fruit-packing is one of the most important industries of the city. There are also foundries, marble works, and fruit drying and canning. A Spanish town was founded here in 1777, and the mission of San José was established two years later. United States troops took possession of the place in 1846, and it was the capital of California from 1849 to 1851. The commission form of government was adopted in 1916. Population, 1910, 28,946; in 1917, 39,810 (Federal estimate).

SAN JOSE SCALE, the most destructive of scale insect pests, was introduced into America from China, but takes its name from San Jose, Calif., where it was first discovered. The insect is so small that it usually makes great headway before being discovered, the largest scales being no larger than the head of a pin. The color is gray, and an infested tree looks as though it were covered with ashes. The scale is particularly destructive to fruit trees, and causes hundreds of thousands of dollars' loss every year. It is estimated that a single female scale may produce over 3,216,000,000 young in a year. The scales are blown about by the wind and are carried by birds and insects; it is therefore impossible to confine them to a single tree or orchard. Spraying the trees with a mixture of lime, sulphur and salt, or with a solution of whale-oil soap containing potash lye, or a mixture of kerosene soap or crude petroleum and hydrocyanic acid gas, is the best means of destroying the insects. The ladybird beetle is a persistent enemy of the San José scale.

SAN JUAN, *hwahn*, PORTO RICO, the capital, largest city and chief seaport of the island, is situated on a small island on the north coast of Porto Rico and connected with the mainland by a bridge. The city is surrounded by a wall, built two hundred fifty years ago. It has an excellent harbor, is regularly laid out and contains a number of plazas and squares. Since the occupation of the island by the United States, the sanitary conditions have been greatly improved. The streets are narrow, the houses are mostly constructed of stone and are of a massive style of architecture. The principal buildings are the city hall, the theater, the military hospital, the Jesuit College, the palaces of the captain-general and the bishop, and a Carnegie Library costing $100,000. The city also has a large market place. It is an important center of tobacco manufacture. Population, 1916, 48,716 (Federal estimate). See PORTO RICO.

SAN'KEY, IRA DAVID (1840-1908), an American evangelist, singer and composer, born in Edinburgh, Pa. He was chiefly known for his association with Dwight L. Moody, whom he first met in Indianapolis in 1870. Sankey had a fine baritone voice, and for many years conducted the singing for Moody's evangelistic work.

SAN LUIS POTOSI, *loo ees' po toh se'*, Mexico, capital of the state of San Luis Potosi, and fourth city of the republic of Mexico, is situated 215 miles northwest of Mexico City on a plateau 6,200 feet above the sea. It is regularly built, has good streets and several plazas, or parks. The most important buildings are the governor's palace, the palace of justice, the townhall, the mint, the exchange, the theater and the Church of San Pedro. The city is an important railroad center and has a large trade in cattle, hides, tallow and wool. It is the seat of a United States consul.

The city first attained its prominence because of its proximity to the famous San Pedro silver mines, which have been abandoned. At present there is a good trade in pottery, mineral products and hides. The manufactures include furniture, woolen goods, soap and cigars. The city was the center of a revolution which broke out in 1910, and was captured by the Constitutionalists in 1914. Population, 1914, 82,946.

SAN MARINO, *sahn mah re'no*, a tiny republic, the oldest in Europe, situated in Northern Italy, about twelve miles from the Adriatic. It has an area of about thirty-eight square miles and a population of about 10,000. The chief industries are wine-making and cattle-raising. The legislative body of the republic is a Council of sixty members, elected by popular vote. From among these is chosen annually a smaller executive council and, semi-annually, two executive officers called regents. The republic issues its own postage stamps and copper coins. There is no public debt. San Marino, the capital, situated 2,650 feet above the sea, is a quaint old town, which has existed since the fourth century. A treaty of friendship exists between the republic of San Marino and Italy, and when the latter declared war against Germany in 1915, the little republic followed suit and sent a thousand men to the war.

SAN MARTIN, *sahn mahr teen'*, a distinguished South American general and a leader in securing South American independence, was born in Argentina and educated in Spain. He entered the army and gained distinction in the war against France, rising to the rank of lieutenant-colonel. In 1811 he learned that the Spanish colonies in South America had rebelled, and at once went to Buenos Aires, organized a group known as the mounted grenadiers, and was given command of a large patriot army. In 1815 he raised an army for the liberation of Chile, but did not reach that country until two years later. He won two important victories over the Spanish forces, one at Chacabuco and the other at Maipo in 1818. After organizing the government of Chile, he helped the Peruvians to gain their independence, and was made Protector of Peru. While in office he instituted a number of needed reforms, then turned his office over to Simon Bolivar (which see), and sailed for Europe, where he died.

SAN SALVADOR', Central America, capital of the republic of Salvador, 120 miles southeast of the city of Guatemala. The city occupies a valley between wooded hills, and to the northwest is the volcano of San Salvador. A railway connects the city with Santa Ana and La Libertad. The chief buildings are the national palace, the university, the cathedral, the national library and an astronomical observatory. The city also has a botanical garden. Its trade in agricultural produce is considerable, and it ships large quantities of indigo. Population, 1916, 65,148.

SANSKRIT LANGUAGE AND LITERATURE. Sanskrit is the classic and sacred language of the ancient Hindus, and the language in which most of their vast literature is written. The date of the introduction of Sanskrit into India is unknown, but it was at least as early as 1500 B. C. It has not been a living and spoken language since 200 B. C., so the ancient forms have been preserved without change. It belongs to the Indo-European family of languages, and is related to the Persian, Greek, Latin, Teutonic, Slavonic and Celtic tongues. It stands in the same relation to the modern Aryan languages of India as Latin does to the languages of Southeastern Europe that are known collectively as the *Romance* languages.

The great value of Sanskrit to the student of languages lies in the fact that through all the centuries it has preserved without change the characteristics of the common language from which the modern languages of India and Europe sprang (see Philology). It has exercised great influence on the scholarship of the world, for its study has led to the study of comparative philology, comparative mythology and comparative religion. Moreover, scholars have arrived at an understanding of the development of Greek, Latin, German, and English largely by comparing them with Sanskrit.

The literature may be divided into two great divisions—the *Vedic,* represented by the *Vedas,* or sacred books of the Hindus, and Sanskrit proper, in which secular works are written. The Vedic is the older, and is sometimes called *Old Sanskrit* (see VEDAS).

Many of the fables about animals and the fairy tales that have gladdened the hearts of children in Europe and America for centuries were originally taken from the Sanskrit.

SANTA ANA, CALIF., the county seat of Orange County, thirty-three miles southeast of Los Angeles, on the Southern Pacific and the Santa Fé railroads and an electric line. The city is in the midst of one of the most fertile regions in Southern California. The industries include the canning of fruit and vegetables, the manufacture of beet sugar and flour, the dressing of lumber, the making of collar pads and the manufacture of soda. Newport Beach is eight miles distant. Population, 1910, 8,429; in 1917, 10,981 (Federal estimate).

SANTA ANNA, *or* **SANTA ANA,** *sahn'ta-ah'na,* ANTONIO LOPEZ DE (1795?-1876), a Mexican general and politician. He entered the army early, took a prominent part in the expulsion of the Spaniards from Mexico and was at first a supporter of Iturbide. Later he went over to the republicans and helped to overthrow Iturbide. He was in the front during all the subsequent Mexican troubles till 1833, when he became president. By 1835 he had made himself practically the dictator of Mexico. In 1836 Texas seceded, and in the war which followed Santa Anna, after a victory at the Alamo, was defeated at San Jacinto by Houston and taken prisoner. In the following year he was released, on condition of recognizing the independence of Texas. In 1841 he was again made president, but three years later his opponents captured him and banished him to Havana. Recalled in 1846, he was again made president, and during the war with the United States he commanded the Mexican army (see MEXICAN WAR). Owing to his repeated defeats, and especially to the capture of Mexico City, he resigned and left the country. He was recalled again in 1853 and was made president, but two years later he was again driven from the country. He returned after the death of Juarez, and died in obscurity in Mexico City.

SANTA BARBARA, *bahr'ba ra,* CALIF., the county seat of Santa Barbara County, 100 miles northwest of Los Angeles, on the Santa Barbara Channel and on the Southern Pacific railroad. The city is picturesquely located on a slope above the bay, has a warm, equable climate and is visited by many tourists and health-seekers. The luxuriant growth of flowers, tropical plants and fruits helps to make the city a delightful residence place. The old Franciscan mission here was established in 1786. It is one of the most important and the best-preserved in California, and it is the only one in which services never have ceased to be held. Other prominent buildings are Anthony's College, hotels, two hospitals, the Arlington and Potter hotels and a public library. Large quantities of beans, English walnuts, lemons and olives are grown in the neighborhood, and the city ships considerable fruit, live stock, wool, petroleum and various minerals. There is a packing house and a film company. Santa Barbara was settled by the Spaniards in 1782, and was incorporated as a city in 1874. The commission form of government was adopted in 1915. Population, 1910, 11,659; in 1917, 15,360 (Federal estimate).

SANTA CLAUS, *klaws.* See SAINT NICHOLAS.

SANTA CRUZ, *krooth,* CALIF., the county seat of Santa Cruz County, seventy-five miles south of San Francisco, on the Bay of Monterey and on the Southern Pacific Railroad. There are also steamship lines for coastwise commerce. The city is beautifully located on a slope above the bay, has a mild, equable climate and is one of the most popular resorts for tourists in the central part of the state. It contains a good bathing beach, picturesque drives and a large public park, overlooking the bay. The surrounding region produces large amounts of fruits, and the city contains a powder mill, and manufactures cement, asphalt, lumber and other goods. It has a large public library. Not far distant are Sequoia Park and Big Tree Forest. The place was settled by Franciscan missionaries in 1791, and the city was incorporated in 1876. The commission form of government is in effect. Population, 1910, 11,146; in 1917, 15,150 (Federal estimate).

SANTA FE, *fay',* ARGENTINA, the capital of Santa Fé province, on the east bank of the Salado River, 230 miles northwest of Buenos Aires. It is connected with numerous cities by rail, and is the seat of a normal school, a Jesuit college, a university and a seminary. It is an important shipbuilding center and

has considerable trade in cattle, hides and lumber. Population, 1916, 59,754.

SANTA FE, *san'tah fa'*, N. M., the capital of the state and the county seat of Santa Fé County, twenty-one miles east of the Rio Grande River, eighty-five miles northeast of Albuquerque, on the Denver & Rio Grande, the Atchison, Topeka & Santa Fé and the New Mexico Central railroads. The site of the city was first visited by Spaniards about 1542, when they found a large pueblo, containing some 15,000 Indians. About 1605 the Spaniards found the place deserted and made a settlement, enslaved the neighboring Indians and opened up extensive gold and silver mines. In 1680 the Indians captured the place, but the Spaniards regained possession in 1692. It was taken by United States troops in 1846. In 1851 it was made the capital of the newly-organized territory and was chartered as a city in 1890. Next to Saint Augustine, Fla., it is the oldest white settlement in the United States.

Santa Fé is beautifully situated on a plain almost 7,000 feet in elevation, and is surrounded by mountain peaks rising to heights of from 10,000 to 13,000 feet. The old Spanish section has narrow, crooked streets, and the buildings are low, one-story adobe structures. The modern part has wide streets and contains many good business blocks and fine residences.

In the center of the city is a public square, known as the Plaza. Facing this on the north is the old governor's mansion, a one-story adobe building, about a square in length, containing an inside court, and built in the early part of the seventeenth century. Here all the governors of the territory, both Spanish and American, resided until 1909, and it was here that General Lew Wallace, when territorial governor, finished writing Ben Hur. In connection with this building is an historical museum, containing early Spanish paintings and many interesting relics. Also of historical interest are the Church of San Miguel, old Fort Marcy, Rosario Chapel, the partly rebuilt Cathedral of San Francisco, and a Scottish Rite Cathedral. The educational institutions include the Saint Michael's College, Loretto Convent, Allison Mission, Mary E. James Mission School, the School of American Archaeology and the government and Saint Catherine's Indian schools, and a school for the deaf and dumb. Other prominent buildings are the capitol, the governor's mansion, the penitentiary, the Federal building, a hospital and the territorial orphan asylum.

In the vicinity are kaolin mines and deposits of coal, but stock raising is the most important industry. The city is principally engaged in wholesale and retail trade with the surrounding region. As a business center it has declined since the construction of the railways and the abandonment of the overland route by way of the Santa Fé trail. The excellent climate has made the city a popular health resort, and its historic interests attract many tourists. Population, 1910, 5,072.

SANTIAGO, *sahn te ah'go,* CHILE, the capital and largest city of the republic, is situated on a beautiful valley between the Andes and the Chilean coast range, on a branch of the Maipo River. It is sixty-eight miles southeast of Valparaiso. The city is well laid out; the streets are paved and lighted by electricity, and there is an excellent electric street railway system. Owing to the prevalence of earthquakes, many of the houses are of only one story and usually occupy a large space of ground, having gardens around them and courts in the interior. The city contains a number of prominent public buildings of recent construction and these add much to its beauty. Among them are the hall of congress, the mint, the exposition palace, the academy of sciences, the national library and the national museum. The city contains a number of educational institutions, among them the University of Chile, founded in 1743, and a normal institute. There are also a botanical garden, an observatory and a number of beautiful parks. The manufactures are of little importance. Santiago was founded in 1541 by Valdivia. On August 16, 1906, an earthquake destroyed hundreds of buildings, valued at more than $10,000,000, killed several hundred people and rendered thousands homeless. Santiago has railway connection with Valparaiso, Concepcion and Buenos Aires. Population, 1914, 398,000.

SANTIAGO, BATTLE OF, a naval battle during the Spanish-American War, fought off Santiago de Cuba, July 3, 1898, between a United States squadron, under Sampson and Schley, and a Spanish fleet, under Admiral Cervera. The Americans had confined Cervera's squadron to the harbor of Santiago for several weeks, while the land forces were completing the investment of the city. Cervera was ordered by his government to at-

tempt to make his escape, and on the morning of July 3 he led a dash from the harbor. After a running fight lasting most of the day, all the Spanish vessels were beached or destroyed, and Cervera and 1700 men were taken prisoner, while 350 Spaniards were killed and 160 wounded. The American loss was one man killed and ten wounded. See SPANISH-AMERICAN WAR.

SANTIAGO DE CUBA, the second city and seaport of Cuba, is situated on an excellent harbor on the south coast of the island, 470 miles southeast of Havana, with which it is connected by rail. The harbor is entered through a narrow channel, which is defended by forts. Its chief buildings are a cathedral and a government palace, a theater and military and other hospitals. The city also has a number of charitable and industrial institutions. It is situated in the midst of a rich agricultural district and exports sugar, hides, wax, tobacco and copper and iron ore. There are a few iron foundries and machine shops and tobacco factories. The town was founded in 1514; it was the chief point of attack by the Americans during the war with Spain and was captured by them July 3, 1898. It was from this harbor, also, that the Spanish fleet attempted to escape at the time of its capture by the United States squadron (see SPANISH-AMERICAN WAR). Population, 1910, 53,614; in 1916, 63,041.

SANTO DOMINGO, SANTO DOMINGO, the oldest existing European settlement in the New World and capital of the Dominican Republic, is situated on the southwest coast of the island, at the mouth of the Ozama River. It is a typical Spanish city and is surrounded by an old wall, built in the early days of the settlement as a defense against pirates and the natives of the island. Most of the inhabitants dwell in thatch-covered houses; ruins of stone mansions, however, give some idea of the former grandeur of the place. The most interesting building is the Cathedral in which Columbus and his son were formerly buried. In the principal square is a statue to the great navigator. The city was founded by Bartholomew Columbus, in 1496. It has a good harbor and is an important center for the export of coffee and sugar. Population, 25,000.

SANTO DOMINGO, or **SAN DOMINGO,** also called the Dominican Republic, a republic occupying the eastern part of the island of Haiti. Its area is 18,045 square miles, making it a little smaller than the state of Delaware. (For physical features, see HAITI.) Most of the land is suitable for cultivation, and in the south and west there are some large plantations. The chief products are sugar cane, coffee, cacao and tobacco. A considerable area is covered with forests of valuable timber, such as mahogany, satinwood, cedar and logwood. There are some minerals, including gold, iron, copper and coal, but they have not been worked.

The inhabitants are a mixed race of Spanish, Indian and negro descent. The Spanish language is in general use. The prevailing religion is Roman Catholicism. Santo Domingo became an independent republic in 1844, and adopted a constitution, which has several times been revised. The executive branch of the government consists of a President, chosen by an electoral college for six years, and his Cabinet of seven ministers. The legislative branch consists of two houses, a Senate of twelve members, elected for six years, and a Chamber of Deputies, of twenty-four members, elected for four years. Each province is administered by a governor appointed by the President.

The state maintains high schools and normal schools, and throughout the republic primary education is practically compulsory. There are about 175 miles of railroad and 700 miles of telegraph lines. At the capital are two banks, the National Bank of Santo Domingo and a branch of the Royal Bank of Canada, which also has a branch at Pedro de Macoris. Most of the trade is carried on with the United States, which in 1905, in accordance with a friendly treaty, assumed charge of the customs in an effort to bring about a settlement of the obligations of citizens to foreigners doing business in the republic. The United States put down a revolt in 1913 and another in 1915. As a result of the impeachment of President Enrique Jimenez a revolt occurred in 1916 which the United States suppressed. Afterward it put the republic under martial law. In June, 1917, Santo Domingo took the side of the allies and severed diplomatic relations with Germany. Population, about 90,000.

SANTOS, *sahn'tos,* BRAZIL, on the Atlantic Ocean, thirty miles southeast of São Paulo. It has a deep harbor, and, next to Rio Janeiro, is the most important seaport of the country. The city is well built and has good streets and a number of parks, as well as public institu-

tions of importance. It is the world's chief port for the shipping of coffee, the number of sacks exported yearly being nearly about nine million. Population, 1916, 91,500.

SANTOS-DUMONT', ALBERTO (1873-), a French aeronaut, who became famous in the early days of aerial navigation. He was born at São Paulo, Brazil, and was educated in France. He inherited a large fortune, most of which he devoted to experiments in air navigation, making his first successful flight with a dirigible in 1899. For this feat he was given the Henri Deutsche prize of 100,000 francs. He was made a Chevalier of the Legion of Honour in 1904, and Officer in 1904. His account of his experiments, *My Airships: A Story of My Life,* was published in 1904. See FLYING MACHINE.

SAO FRANCISCO. See SAN FRANCISCO (river).

SAONE, *sone,* a river in the eastern part of France, which rises in the department of Vosges, flows southwest, then south, and joins the Rhone at Lyons. It is a link of an extensive waterway, being navigable two-thirds of its 300 miles and connected by canal with the Seine, the Meuse, the Rhine, the Loire and the Moselle. Chalon-sur-Saône, one of the largest industrial cities of France, is on its banks.

SAO PAULO, BRAZIL, the capital of the state of São Paulo, and second city of the Republic, is situated 210 miles southwest of Rio de Janeiro, and twenty-five miles from Santos, its seaport. The city is on a plateau, and has a mild and healthful climate. São Paulo is rapidly-growing, is modern in every respect, and has the reputation of being one of the cleanest cities in North and South America. The city has long streets traversed by street railways, lined with busy shops and lighted by electricity. The cathedral, the government building, the treasury, the Episcopal palace and the Ypiranga Palace, erected to commemorate the Declaration of Independence, are the most important buildings. There is a large hospital, also a law school that is widely known.

São Paulo is the leading manufacturing city of Brazil, and it owes its wealth and progress to the great state of which it is the capital. From this state is shipped more than half the world's supply of coffee. The city has railway connection with Rio de Janeiro, Santos, Buenos Aires and the leading cities of the surrounding states. São Paulo was founded in 1354, but its present growth did not begin until 1890. Population, 1911, estiated, 450,000.

SAP, the juice or fluid which circulates in all plants. Sap is to the plant what blood is to the animal. There are two kinds of sap, namely, *crude sap* and *elaborated sap.* Crude sap consists of the watery fluid taken up by the roots. It contains in solution the plant food taken from the soil. The elaborated sap is formed from the crude sap by the changes it undergoes in the leaves. It is the latter that nourishes the plant.

The circulation of sap is studied most conveniently in a tree. The tree has two kinds of wood, the dark hard wood in the center, known as the *heart wood,* and the light, softer wood under the bark, known as the *sap wood.* The crude sap is taken up by the roots, and it ascends the trunk and branches until it reaches the leaves, where it is changed to elaborated sap. From the leaves the elaborated sap returns to the branches and trunk, which it descends to the roots. It circulates between the bark and the wood, and forms the new layer of wood each year. In some trees this sap has the appearance of mucilage; in others it is more like water. In several species of trees such as the elm, the hemlock and the willow, this sap so loosens the bark in late spring and early summer that the bark can be easily stripped from the tree.

Sugar is made from the sap of beets, sugar cane and the sugar maple. Opium and many other used drugs are made from the sap of plants. The fluid from which rubber is made is not, botanically considered, sap. See PLANT; TREE.

SAPAJOU, *sap'a joo,* a group of South American monkeys, characterized by their small size, long tails and general intelligence. The monkeys carried around by organ grinders are usually sapajous. The largest species measures forty inches in length, including twenty inches of tail. The best-known species are the *white front,* having a white forehead and light brown fur; the *spider* monkeys, and the *capuchins,* the latter so called because the hair on the head resembles a monk's hood. These monkeys live in trees and feed upon fruit, insects, and sometimes small animals. See MONKEY.

SAPPHIRE, *saf'ire,* a transparent, blue stone, next in hardness to the diamond, belonging to the corundum class. Sapphires

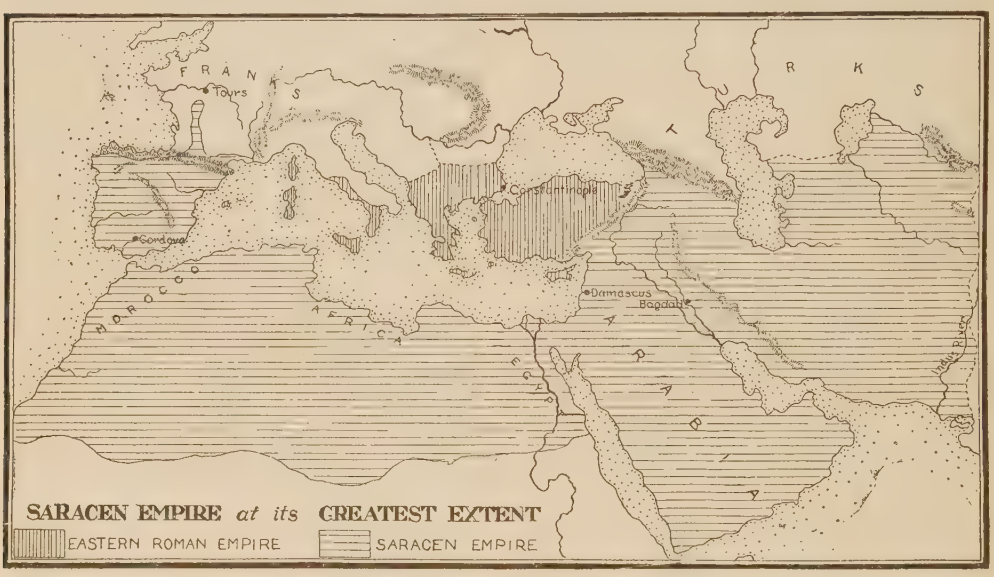
are found in Burma, India and Ceylon, in Asia; Bohemia and Silesia, in Europe; and in the United States, chiefly in Montana. Sapphires vary from pale blue to deep indigo, but the most valuable are of cornflower tint. The sapphire is the birthstone for September.

SAPPHO, *saf'o*, a celebrated Greek poetess, born probably in the seventh century B. C., at Mitylene, on the island of Lesbos. Little is known regarding her life, but she has been made the subject of many legends. At Mitylene, Sappho appears to have been the center of a group of maidens whom she instructed in the art of song. Her odes, elegies and epigrams, of which only fragments have come down to us, display deep feeling and imagination. By the ancients she was known as the "Lesbian nightingale."

SAP'SUCKER, a group of birds belonging to the woodpecker family, given their name because they feed on the sap of trees, which they obtain by pecking holes through the bark. There are several varieties, but the *yellow-bellied* sapsucker is the best known. The male has a red head and throat and a black coat with white markings. It is found throughout the northern part of the United States and Canada. The nest is made in holes in trees, and the eggs, seven or eight in number, are white. The *red-breasted* sapsucker and the *Williamson* sapsucker are found west of the Rocky Mountains. See WOODPECKER.

SAPUL'PA, OKLA., the county seat of Creek County, in the heart of the oil district of the state, 105 miles northeast of Oklahoma City and fourteen miles from Tulsa, and on several lines of the Saint Louis & San Francisco Railroad. There are oil refineries, glass factories, cotton compresses and numerous lesser enterprises. The city has a government Indian school, a Carnegie Library and a hospital; a Federal building is in prospect. Population, 1900, 891; in 1917, 13,678 (Federal estimate).

SARACENS, *sar'a senz*, the name applied by the ancient Greeks and Romans to the inhabitants of Northern Arabia. During the Middle Ages, the name was applied to all Mohammedans and to the Arab Moors who in the eighth century set up a kingdom in Spain, and attempted to overrun Europe. Their plan was frustrated by Charles Martel at the Battle of Tours, where the Saracens suffered a disastrous defeat.



SARAGOSSA, *sah ra gohs'sa*, SPAIN, capital of Saragossa province and an important commercial city, is situated on the Ebro River, 212 miles northeast of Madrid and on the site of an ancient Iberian town. The center of the city is characterized by narrow, crooked streets and old, dilapidated buildings. Around this center has been built a modern city with broad streets and modern buildings. The most important buildings are the cathedral, dating from the twelfth cen-

tury, the archbishop's palace and the Castilio de la Aljaferia, which was at one time the residence of the king of Aragon. There are several higher schools, including a university founded in 1474. The city is an important railroad and industrial center. Its manufactures include foundry and machine shop products, flour, glass, chemicals, soap and candles. Population, 1917, 124,455.

SARAJEVO, *sar'a ya vo,* or **SERAJEVO**, the capital city of Bosnia, formerly a province of the Austro-Hungarian monarchy. The city was the center of worldwide interest in June, 1914, when it was the scene of the assassination of the heir apparent to the Austrian throne. Out of this tragedy came the World War, lasting until 1919. Serajevo has a delightful situation in a gardenlike region along the Miljacka River. It is 122 miles southwest of Belgrade, with which it hereafter will be associated as a city of Jugo-Slavia. The Bosnian capital has many modern improvements, as well as picturesque antiquities. Among the institutions is a Roman Catholic seminary. In normal years the place is a thriving trading center, with metal-ware factories, dyeing and silk weaving plants, potteries and a large brewing establishment. Population, about 52,000. See WORLD WAR; JUGO-SLAVIA.

SARATOGA, BATTLES OF, two engagements near Saratoga Lake, N. Y., which were the turning point in the Revolutionary War. They are also known as the Battle of Freeman's Farm, the Battle of Bemis Heights and the Battle of Stillwater. The British general, Burgoyne, with a force of 10,000 men, had marched from Canada by way of Lake Champlain, expecting to meet the forces of Lord Howe, who was in New York, at Albany, and form a line of military outposts that would separate the New England colonies from the other colonies. At Saratoga Burgoyne met an American army under the command of Arnold, Gates and Schuyler. On September 13, 1777, Burgoyne advanced against the American position on Bemis Heights, but was unable to dislodge the Americans from their position, and it was three weeks before the contest was renewed. On October 7, the British made a second attack on the Americans, and were disastrously defeated. The assistance which Burgoyne expected failed, his supplies were cut off, his forces were completely surrounded by the Americans, and he was forced to surrender October 17. This victory so advanced the prestige of the American cause in Europe that a treaty of alliance with France was negotiated, and with the assistance of the French, the American cause eventually triumphed. The Battle of Saratoga is regarded as one of the decisive battles of the world. See FIFTEEN DECISIVE BATTLES.

SARATOGA SPRINGS, N. Y., in Saratoga County, thirty-eight miles north of Albany, on the Boston & Maine and the Delaware & Hudson railroads. It has about fifty springs, which give forth waters with medicinal properties, and is a very popular health and summer resort. The village is on the southernmost spur of the Adirondacks, at an elevation of about 300 feet, in a region free from swamps and marshes. There are large hotels, which are said to have accommodated as many as 40,000 guests at one time. A Convention Hall, seating 6,000 people, has made it a favorite place for conventions. Saratoga Lake, four miles distant, has been the scene of numerous regattas. The races during August and a floral fête in September also add to the popularity of the resort. The village contains an athenaeum, a public library, an art school, a town hall, Saint Faith School, a state armory, a home for orphans and two hospitals. Since 1826 the mineral waters have been shipped to various parts of the world. The principal industries are the bottling of these waters, the making of carbonic acid gas and the manufacturing of foundry products, paper-mill machinery and supplies for druggists and doctors.

Saratoga is an Indian name meaning *hillside of the great river.* The first building was erected in 1773, but the village did not begin to grow until twenty years later. Population, 1910, 12,693; in 1917, 13,839 (Federal estimate).

SARATOV, *sah ra tohf',* RUSSIA, capital of a government (province) of the same name, 32,624 square miles in area. The city is 450 miles southeast of Moscow, east of the Ukraine. It is a city of wooden buildings, chiefly, but before the World War was prosperous. It has a university, founded in 1909, schools of theology and drawing, and a museum. Population, 1913, 235,500.

SARCOPHAGUS, *sahr kof'a gus,* a stone coffin. The earliest speciments were found in Egypt and were made of alabaster, limestone, granite or some other durable material. The oldest ones are rectangular in shape and have a flat or curved cover and little orna-

mentation. But the later ones have the shape of the human body and are covered with inscriptions or with carved figures of the kings. The Greeks, Romans and other ancient people made use of stone coffins, and those of the wealthy were ornamented with beautiful designs cut in the stone. Stone coffins are common at the present time among persons of wealth.

SARD, or **SARDOIN**, a variety of chalcedony, which displays on its surface a rich reddish-brown, but when held between the eye and the light appears of a deep blood-red hue. See CARNELIAN.

SARDANAPA'LUS (668–624 B. C.), the name given by the Greeks to the last of the great Assyrian kings, who is generally known in history as ASSURBANIPAL. He reigned in Nineveh for forty-two years, and was noted for his interest in literature and art, as well as for his military prowess. He erected magnificent buildings at Nineveh and Babylon, and collected at Nineveh a great library consisting of thousands of clay tablets engraved in cuneiform characters. Many of these tablets are now in the British Museum.

SARDINE, *sahr deen'*, a small fish of the herring family, abundant in the Mediterranean and also on the Atlantic coasts of France, Spain and Portugal. It is much esteemed for its flavor, and large quantities are preserved by being salted and partly dried, then scalded in hot olive oil and finally hermetically sealed in tin boxes, with hot salted oil or with oil and butter. Commercially the name is applied to any small fish put up in oil. On the eastern coast of Maine, young menhaden are canned as sardines, but they are much inferior to the real sardine of Europe. The sardine of the Pacific coast of the United States is a valuable food fish, but it is not canned. It is about a foot long, dark-bluish above and silvery below.

SARDIN'IA, the second island in size in the Mediterranean Sea, forming a part of the kingdom of Italy. It is 115 miles southwest of Italy, and is separated from Corsica by the Strait of Bonifacio, nine miles wide. Sardinia is 170 miles long, eighty miles wide in the widest place, and has an area of 9,306 square miles, about equal to that of the state of New Hampshire. The interior is mountainous and hilly, and has many rapid streams. The valleys between the mountains are noted for their fertility, and live stock, wheat, olives, grapes, oranges, lemons and tobacco are raised. About one-fifth of the land is covered by forests.

The chief minerals are lead, zinc, silver and antimony. These, with lignite, granite and salt, constitute the commercial products of the mines. The island has a valuable foreign trade, exporting minerals and agricultural products, and importing such manufactures as are needed by the inhabitants. Politically it is divided into two provinces, Cagliari and Sassari. Cagliari, the capital, has about 60,000 inhabitants; the population of the island is about 864,000. It was formerly a part of the kingdom of Sardinia.

SARDIN'IA, KINGDOM OF, a former kingdom of the south of Europe, the nucleus of United Italy, composed of the island of Sardinia, the duchy of Savoy, the principality of Piedmont, the county of Nice, the duchy of Genoa and parts of the duchies of Montferrat and Milan. In 1720 Victor Amadeus, duke of Savoy, on receiving the island of Sardinia in exchange for Sicily, took the title of King of Sardinia. Turin was the capital, and Piedmont, not the island, was the most important part of the kingdom. Amadeus was succeeded by Charles Emmanuel I, Victor Amadeus II and Charles Emmanuel II, the latter of whom, in 1802, abdicated in favor of his brother Victor Emmanuel I, the royal family having by this time, on account of the invasion of Italy by Napoleon, taken refuge on the island of Sardinia. In 1814 the king returned to Turin. An insurrection brought about his abdication in 1821 in favor of Charles Felix, who, after a reign of ten years, was succeeded by Charles Albert. In 1848 Charles Albert headed the league which endeavored to drive the Austrians from Italy. The defeat of the Sardinian forces at Novara (1849), however, caused him to abdicate in favor of his son, who came to the throne as Victor Emmanuel II.

The position of Sardinia was strengthened by the part which it played in the Crimean War, and in 1859 the coöperation of France was secured in a war against Austria. The brief campaign which followed ended in the defeat of the Austrians at Magenta and Solferino and resulted in the cession to Sardinia of a large increase of territory, though she was compelled to cede Savoy and Nice to France. Soon after this the Sardinian kingdom was merged in the united Italian kingdom under Victor Emmanuel. See VICTOR EMMANUEL II; ITALY, subhead *History*.

SARDONYX, *sahr'doh niks*, a precious stone, a beautiful and rare variety of onyx, consisting of alternate layers of sard and white chalcedony. The name has sometimes been applied to a reddish-yellow or nearly orange variety of chalcedony, resembling carnelian, and also to carnelians, the colors of which are in alternate bands of red and white. Sardonyx is deemed by many theologians to be the emblem of spiritual strength. See ONYX.

SARDOU, *sahr doo'*, VICTORIEN (1831–1908), a French dramatist, born in Paris. He at first studied medicine, but abandoned this in favor of literature. His earliest venture was the comedy of *The Students' Inn*, which proved a failure, at the Odeon. However, he continued his efforts and soon attained success in every field of the drama, with the exception of tragedy. His better known works, many of which have been produced on the English stage, are *Our Intimates*, *The Butterfly*, *Daniel Rochat*, *The Benoiton Family*, *Dora* and *Madame Sans Gêne*. His later successes were associated with Madame Bernhardt, for whom he wrote *Fédora*, *Théodora*, *La Tosca* and *The Sorceress; Robespierre* was written for Sir Henry Irving.

SARGASSO SEA, *sahr gas'o*, a large tract of seaweed in the North Atlantic Ocean located between the 25th and 30th parallels, north latitude, and the 38th and 60th meridians, west longitude, although its position changes slightly owing to the influence of winds and currents. The sea has about four-fifths the area of Texas. It was discovered by Columbus on his first voyage, and his ships were delayed by it. It is avoided by navigators because it is more or less of an obstruction to ships.

SARGENT, JOHN SINGER (1856–), one of the foremost American portrait and genre painters, was born at Florence, Italy, of American parents. He was educated in Italy and Germany. At the age of eighteen he became the pupil of Carolus Duran, who greatly influenced his career. When twenty years old he made his first visit to the United States, and subsequently has spent short periods in America. His home, however, has always been in Paris or London.

Sargent ranks as one of the greatest portrait artists of his time, and numbered among his sitters Duran, Monet, Edwin Booth, Joseph Jefferson, Ada Rehan, Ellen Terry as Lady Macbeth, John Hay, and Theodore Roosevelt. *Carmencita*, a dancer in costume, and *Carnation Lily, Lily Rose*, two girls lighting Japanese lanterns in a flower garden, are among his most popular pictures; paintings in the Boston Public Library are among the finest of his mural decorations. He has also executed many landscape and figure pieces.

SAR'NIA, ONT., the county seat of Lambton County, on the Saint Clair River and on the Grand Trunk and the Pere Marquette railways, sixty-one miles west of London. It is connected with Port Huron, across the river, by ferries and by a railway tunnel about one and one-quarter miles long. The leading industrial establishments include foundries, machine shops, oil refineries, salt works and factories for the manufacture of engines and agricultural implements and woolen goods. Population, 1911, 9,947; in 1918, about 12,000.

SARPEDON, *sar pe'don*, a hero of the Iliad, was king of the Lycians and ally of the Trojans. He was slain by Patroclus, and his body was rescued and purified by Apollo. According to different accounts, he was either the son of Jupiter and Laodamia or the grandson of another Sarpedon, the son of Jupiter and Europa.

SARSAPARIL'LA, a drug obtained from the roots of several species of smilax. The plants are tough, twining shrubs, with prickly stems, small flowers and shiny leaves. They are natives of the warm regions of America, being found in South America and on the Mexican Andes. The dry roots of the plant are used in medicine and are odorless and bitterish. Formerly sarsaparilla was considered an efficacious cure in various diseases, but it is now used mostly in spring medicines. Though popularly believed to have a mild tonic effect, physicians and chemists do not consider it valuable as a remedy. It is used to some extent for flavoring soda water.

SARTO, *sahr'toh*, ANDREA DEL (1487–1531), a Florentine master, known for the excellence of his technique as the "Faultless Painter." His real name was ANDREA VANNUCCHI, Del Sarto (meaning *the tailor's son*) being a nickname because of his father's trade. Del Sarto studied painting under several Florentine masters, and at the age of thirty already had executed a beautiful series of frescoes in the Church of the Servites and was recognized as one of the best

fresco painters in Florence. Ten scenes from the life of John the Baptist and a *Last Supper* are among his famous frescoes; the most celebrated of his single paintings are the *Madonna del Sacco,* for the Servites, and the *Madonna of the Harpies,* now in the Uffizi Gallery. Other famous paintings include the *Annunciation,* several Holy Families, a number of portraits, and numerous subjects for altar pieces. His oil paintings are found in almost every European art gallery. Del Sarto was the inspiration of one of Browning's famous poems, *Andrea Del Sarto.*

SASKATCHEWAN, *sas katch'e wahn,* a province of the Dominion of Canada, lying south of the North West Territories and north of the American states of Montana and North Dakota. It touches two other organized Canadian provinces, Alberta on the west and Manitoba on the east. Saskatchewan was formed in 1905 from parts of the districts of Alberta, Saskatchewan and Assiniboia. Its north and south extent is 760 miles; the northern boundary is 277 miles long, and the southern is 393 miles. The area, 251,700 square miles, is over twice that of New Mexico, and is smaller than that of Manitoba by only 132 square miles. Among the organized Canadian provinces, Saskatchewan ranks sixth in size; Texas is the only American state which exceeds it in area.

People and Cities. In 1911 the population of Saskatchewan was 492,432; in 1916 it was 647,835. The average density per square mile for the province as a whole is about 2.5, but this figure is misleading unless one takes into consideration the fact that the northern part is as yet unsettled. The proportion of town and city dwellers to those who live on farms is about one to two and one-half. About fifty per cent of the inhabitants are of English descent; the remainder are immigrants from the United States and various European countries. Regina is the capital and largest city; other important cities are Saskatoon, Moose Jaw and Prince Albert.

Physical Features. North of the international boundary and extending to the Saskatchewan River there is a rolling prairie region, diversified occasionally by lakes and patches of woodland. In the eastern part of the region are two ranges of hills, the Beaver and the Touchwood, lying north of the valley of the Qu' Appelle River. This river, the Assiniboine, the Souris and the Saskatchewan drain the southern part of the province. In the north there is a great forest belt of cone-bearing trees; to the south of it, and occupying the central part of the Province, is an attractive region of alternating farm and forest country. The Churchill River, flowing across the central region, drains a chain of beautiful lakes, including Reindeer and Lac la Rouge. Other lakes of importance are Athabaska, in the northwest, Wallaston, in the northeast, Beaver, near the center, and Big Quill, in the south.

Saskatchewan has a healthful, bracing climate. Throughout most of the province the winters are long and cold, but in the southeastern corner the temperature is modified by the warm Chinook winds (see CHINOOK).

Agriculture. Saskatchewan ranks first among the provinces in the production of wheat, oats and flax, and is second in the production of live stock. Barley and rye are also cultivated, and practically all kinds of garden vegetables are grown. The production of field crops (in bushels) for the year 1918 is shown in the following table, the figures being official estimates:

Wheat	106,366,500
Oats	134,689,500
Barley	14,160,700
Rye	1,667,300
Flax	5,466,200

There are about 325,000 dairy cows in the province, and the dairy industry is in a prosperous condition. This industry is centered chiefly in the parklike region between the Saskatchewan and Churchill rivers. Creamery butter is produced in sufficient quantity for export, the annual output exceeding 4,220,600 pounds. Cheese making is also developing rapidly. Horses, sheep and swine are raised in large numbers, and the poultry industry is receiving general attention. At Saskatoon there is a college of agriculture which gives scientific aid to all branches of farming.

Other Industries. The manufacture of lumber products, brick making and flour milling are the chief branches of manufacturing, but manufacturing industries have not

SASKATCHEWAN

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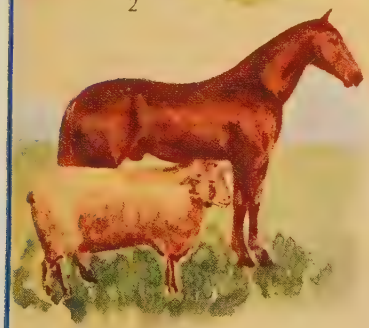

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H.M. HAINES.

1, Parliament Building at Regina.
2, Experimental Farm at Indian Head.
3, Threshing Scene.
4-5, Live Stock.
6, Fruits and Vegetables.
7, Grain Elevator.
8, Oat Field.

as yet developed very extensively. The larger towns support a large variety of industrial plants which supply the local demand. Prince Albert is the center of the provincial lumber industry, and Saskatoon has one of

COAT OF ARMS OF SASKATCHEWAN

The British lion, on a gold background, symbolizes the unity of the province with the British Empire. The three stacks of golden wheat, on a green background represent Saskatchewan's position as the premier wheat province of the Dominion.

the largest flour mills in the Dominion. Both Saskatoon and Regina are important distributing centers, and the latter city has the largest trade in agricultural implements of all the Canadian cities. The province is surpassed in mineral production by all of the other organized provinces, yet the value of its annual output was over $855,000 in 1918. Clay suitable for making bricks occurs in many localities, and at Estevan, in the extreme southeast, the clay deposit rests on lignite coal. Estevan is the chief center of coal mining, but other deposits have been discovered west of Saskatoon. Other minerals of importance include gold, silver, petroleum and natural gas.

Transportation. Saskatchewan is traversed from east to west by three trunk lines—the Canadian Pacific, the Canadian Northern and the Grand Trunk Pacific. All of these roads have numerous branches and feeders, and the province as a whole has a railroad mileage of about 6,000. The chief railway centers are Regina and Moose Jaw, in the south, and Saskatoon and Battleford. The latter is in the northern part of the settled portion of the province.

Items of Interest on Saskatchewan

"Saskatchewan" is a Cree Indian word meaning *rapid-flowing river.*

Over $320,000 worth of fish are taken from the lakes of the province each year, whitefish being the most important.

The country north and east of Prince Albert is heavily timbered with tamarack, spruce and jack pine. There are about 9,680 square miles of forest reserves in the province under the Dominion government.

Over 11,000 Indians, chiefly Crees, live on government reservations and support themselves.

In Saskatchewan there is a colony of Dukhobors, a religious denomination whose members refuse to perform military service.

The province enacted a prohibition law during the World War.

Questions on Saskatchewan

What is the area of Saskatchewan? Compare it with that of Great Britain and with that of New Brunswick.

Describe the surface of the province.

Name the principal rivers.

Compare the wheat crop of Saskatchewan with that of the other provinces.

How does Saskatchewan rank as a producer of oats?

What other crops are of importance?

Where is coal found in Saskatchewan?

What are the principal manufactures?

Where is the provincial university located?

Describe briefly the school system of the province.

What is the total railway mileage?

How many representatives has the province in the House of Commons?

What are the principal cities?

What was the population in 1911?

What would be the population of Saskatchewan if it were as thickly settled as New Brunswick?

What is the extreme length and width of the province?

What is the capital city?

Education. Children are compelled by law to attend the free public schools, which are under the direction of a minister of education. The University of Saskatchewan at Saskatoon is at the head of the school system; normal schools at Regina and Saskatoon are also maintained by the provincial government. The school district is the unit for public education, and the affairs of each district are managed by a local board. There are several colleges in the province under denominational control.

Government. The chief executive officer is the lieutenant-governor, who is appointed by the Governor-General of the Dominion. An executive council, or cabinet, of eight members, at the head of which is the premier, assists the lieutenant-governor, whose term of office is five years. The legislative power is vested in an assembly of sixty-two members. Saskatchewan sends sixteen delegates to the Dominion House of Commons. There is a provincial judiciary composed of a supreme court and district courts. Women enjoy municipal and provincial suffrage.

History. Saskatchewan was organized in 1905 from various districts included in the old North West Territories. Its history as an organized province has been mainly one of peaceful development and prosperity, and it was a loyal supporter of the mother country throughout the World War.

Related Articles. Consult the following titles for additional information:

Assiniboine (river)	North West Territories
Athabaska Lake	Prince Albert
Battleford	Red River Rebellion
Canada (history)	Riel, Louis
Churchill River	Saskatchewan Rebellion
Hudson's Bay Company	Saskatchewan River
Moose Jaw	Saskatoon

SASKATCHEWAN REBELLION, an uprising of the half-breeds in the Canadian Northwest in 1885, under the leadership of Louis Riel (see RIEL, LOUIS). For the causes leading to this outbreak, see RED RIVER REBELLION. After the Red River Rebellion the *Metis*, or half-breeds, were pacified by being given 248 acres of land each, but as settlers poured into Manitoba, a large number of the *Metis* moved into Saskatchewan, where they were again disturbed by settlers, and especially by the building of the Canadian Pacific Railway. They found that the herds of buffalo, upon which they depended for their meat, would be exterminated, and feared that they would lose their lands, since they had no titles to them. In 1884 they sent for Riel, who since the Red River Rebellion had been living in the United States, to return and help them maintain their rights. In March, 1885, a provisional government was organized at Saint Laurent, and Riel was chosen president.

Probably the difficulty would have been adjusted without resort to arms had not an encounter taken place at Duck Lake, between some of the Mounted Police and the half-breeds. This was followed by an uprising of the Cree Indians who attacked the settlement at Frog Lake, killed the men and carried away the women and children. The Canadian government at once sent forces under General Middleton to quell the disturbance. The insurgents were defeated at all points. The Cree chiefs surrendered; Riel was taken prisoner, tried and hanged for treason. Since then there has been no trouble.

SASKATCHEWAN RIVER, a river of Canada, which with the Nelson forms the greatest river system entering Hudson Bay, and one of the four great river systems east of the continental divide. The Saskatchewan is formed by two branches often known as the North Saskatchewan and the South Saskatchewan. The north branch rises in the Rocky Mountains, in the west part of Alberta, and the south branch, which is often known in the upper part of its course as the Bow River, rises in the vicinity of Devil's Lake, in western Alberta. After winding courses of 800 to 900 miles, these streams unite in the province of Saskatchewan, and the united stream flows eastward into Lake Winnipeg. From this lake it is generally known as the Nelson (see NELSON RIVER). The length of the united Saskatchewan is about 300 miles, making the entire length from the source of the Bow to the mouth 120 miles. The area of the drainage basin of the Saskatchewan-Nelson system is 370,800 square miles, or about one-tenth the area of the Dominion of Canada. Below Cedar Lake, through which the river flows, navigation is interrupted by rapids, but west of the lake it is navigable for steamers to the junction of the two branches, and smaller boats ascend the stream as far as Edmonton 500 miles farther.

SASKATOON', SASK., the sixteenth city in Canada in size, on the Saskatchewan River and on the Canadian Pacific, the Canadian Northern and the Grand Trunk Pacific railways, 466 miles west of Winnipeg and 335

miles east of Edmonton. Branches of these roads radiate from Saskatoon in all directions, making the city one of the most important railway centers in Western Canada; it controls a business territory of nearly 50,000 square miles. Many large firms of Canada and the United States have established factories and warehouses here. The wholesale trade is conducted by 200 firms and includes the distribution of groceries, provisions, hardware, lumber and agricultural implements. There are manufactories of breakfast foods, flour, tractors and clothing. The city has thirteen banks, a Dominion lands office, a land titles office and a collegiate institute. The University of Saskatchewan and the agricultural college and experimental farm of the province are located here. Population, 1901, 113; in 1916, 21,054.

SAS'SAFRAS, a tree belonging to the laurel family, widely known for its medicinal properties. In the northern part of the United States it is a shrub or small tree, but in the South it grows to the height of forty-five feet. Its range is from Southern Vermont to Florida. The leaves are oval, two-lobed and three-lobed; the three forms often appearing on the same branch. In the autumn the foliage turns to scarlet and deep yellow. From the bark an aromatic oil is obtained, and the bark itself is steeped to make "sassafras tea," popularly believed to be a blood purifier. The taste of sassafras is bitter and aromatic, and it is sometimes used for flavoring.

SATELLITE, a small planet revolving around a larger one, as the moon revolves around the earth. So far as known there are twenty-nine satellites in the solar systems, distributed as follows: Earth, one; Mars, two; Jupiter, nine; Saturn, ten, and three rings; Uranus, six; Neptune, one. Like planets, satellites shine with light from the sun.

SAT'IN, a soft, closely woven silk, with a glossy surface. In the manufacture of satin, part of the weft is left beneath the warp, which, presenting a close and smooth surface, acquires, after being passed over heated cylinders, that luster which distinguishes it from other kinds of silks. It is of Chinese origin, but is now made extensively in Europe, Great Britain and the United States. Satin is the term applied to silk material; *sateen,* to woolen, linen and cotton imitations. As in silk, tin is sometimes used as an adulterant.

SAT'IRE, the name given a poem in which people and events are ridiculed. It originated with the Roman writer Lucilius, and it was developed by Horace and Juvenal. Satire may also take the form of epistles, tales, dialogues, songs or fables. Swift's *Gulliver's Travels* is one of the greatest satires ever written. Among English poems, Dryden's *Absalom and Achitophel* and Pope's *Dunciad* are the most celebrated. Lowell's *Biglow Papers,* a series of poems, is the most noted satire in American literature.

SAT'URDAY, the seventh day of the week, named for the Roman deity Saturn. Saturday is the Sabbath of the Jews and of the Seventh Day Adventists.

SAT'URN, in classical mythology, an early god, the husband of Rhea and father of Jupiter, Neptune, Pluto, Juno, Vesta and Ceres. He deposed his own father, Uranus, and ruled in his stead. Fearing a prophecy that he in his turn would be dethroned by his son, he swallowed his children as soon as they were born. Jupiter alone was saved by a strategem of his mother. He deposed Uranus and compelled him to disgorge the five children whom he had swallowed. Saturn then withdrew to Italy, where he founded a prosperous kingdom, and his reign was known as the Golden Age. In art Saturn is represented as Father Time.

SAT'URN, a planet of the solar system, in position sixth from the sun, which is about 886,000,000 miles distant from it. It is about 70,000 miles in diameter, being second in size to Jupiter. The surface area is about ninety times that of the earth, but Saturn is only about one-eighth as dense as our planet. It rotates upon its axis in about ten hours, and makes a revolution around the sun in twenty-nine and a half earth years. The planet is surrounded by a system of flat rings composed of meteoric particles that produce a gauzy effect resembling dust in a ray of sunlight. The band of concentric rings is about 10,000 miles wide and 100 miles thick. The diameter of the outer ring is about 173,000 miles. Saturn has also ten satellites, the largest of which is Titan, about 3,000 or 4,000 miles in diameter. Seen with the unaided eye, Saturn is a bright star, with a slightly reddish tint. Like Jupiter, it is a gaseous body, surrounded by a very dense atmosphere. It is best seen in late summer and early autumn in the eastern or southeastern sky, moving south as the evening advances.

SATURNA'LIA, a festival held by the Romans in honor of Saturn, during which the citizens, with their slaves, gave themselves up to unrestrained freedom and mirth. It lasted under the Caesars, seven days, namely, from the seventeenth to the twenty-third of December. During its continuance no public business could be transacted, the law courts were closed, the schools kept holiday and slaves were free from restraint. Masters and slaves even changed places, so that while the servants sat at table, they were waited on by their masters and their guests. The last days of the festival were spent in visiting and giving presents. Little clay images called *sigillaria* were the principal gifts.

SATYRS, *sat'ers,* in Greek mythology, a class of woodland divinities, in later times inseparably connected with the worship of Bacchus. The satyr appears in works of art as half man and half goat, having horns on the head and a hairy body, with the feet and tail of a goat. Satyrs are described as being fond of wine and of every kind of sensual gratification. Pan was the chief of the satyrs, and one of the most famous specimens of Greek art is the Satyr of Praxiteles.

Related Articles. Consult the following titles for additional information:

Fauns
Mythology
Pan
Silenus

SAUL, the first king of Israel, who reigned from about 1095 to 1056 B. C. He was inducted into his office by Samuel, the last judge of Israel. During his reign he united the tribes and gained several victories over the Philistines, Edomites and other hostile nations. He was self-willed, and the last years of his reign were clouded by a quarrel with David, of whom he became insanely jealous. His history is told in *I Samuel.* See, also, BIBLE, subhead *Bible Stories.*

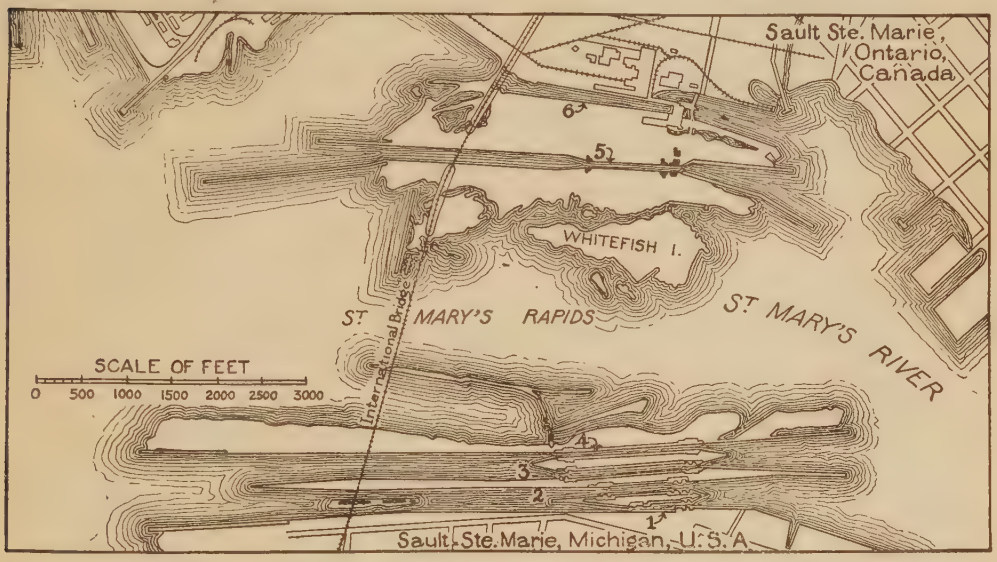
SAULT SAINTE MARIE, *soo saint ma re',* or (French) *so saNt ma re',* ONT., on the Saint Mary's River and on the Canadian Pacific, the Algoma Central and the Hudson Bay railroads. There is steamship connection with all lake ports, through the great Sault Sainte Marie Canal (which see). The place is connected with Sault Sainte Marie, Mich., on the opposite side of the river, by a railway bridge one mile long. The town has large power plants, important ore and paper mills, foundries and other manufactories. In the neighborhood are mines of iron, copper and silver, and there is a flourishing lumber industry. In 1917 the city annexed Steelton. A new power canal which cost $1,000,000, developing 28,000 horse power, was completed in 1918. Population, 1917, 19,500.

SAULT SAINTE MARIE, MICH., popularly called "the Soo," the county seat of Chippewa County, 350 miles nearly north of Detroit, on Saint Mary's River and on the Duluth, South Shore & Atlantic, the Canadian Pacific and the Minneapolis, Saint Paul & Sault Ste. Marie railroads, and on the Sault Sainte Marie Canal (which see), connecting Lake Superior with Lake Huron. The largest inland commerce in the world passes through the canal. The falls in the river have been utilized in the development of very extensive electrical power. Connection with the Canadian city of the same name is by a great bridge a mile long. The industrial establishments are fish-packing houses, lumber mills, leather, carbide and woolen mills, paper mills and other factories. The city has a Carnegie Library, a hospital and a Federal building. The first permanent settlement within the present state of Michigan was made here by Father Marquette in 1662. Population, 1910, 12,615; in 1917, 14,130 (Federal estimate).

SAULT SAINTE MARIE CANAL, also called **SAINT MARY'S CANAL,** the canal around the rapids in the Saint Mary's River at the outlet of Lake Superior. There are really five canals—one on the Canadian side and four on the American side of the river. Measured by the traffic, the Sault Sainte Marie is the most important canal in the world. It has a length of one and one-half miles and a drop of eighteen feet.

The first canal was built by the state of Michigan in 1855, and was reconstructed by the United States in 1881. This was the first of the modern locks, and is known as the Weitzel lock; it is 515 feet long, eighty feet wide, and has seventeen feet of water on its mitre sills. The Poe lock, completed in 1896, is 800 feet long, 100 feet wide, and has twenty-two feet of water on its sills. At the time of its completion, this was the largest lock in the world. Meanwhile, the Canadian government completed a lock on the north side of the river, 900 feet long, 150 feet wide and twenty-three feet deep. But the increase in lake traffic called for still greater canal facilities, and in 1908 the United States ordered the construction of the Davis lock, north of the Poe lock. This was com-

pleted in 1914; it is 1,350 feet long, eighty feet wide and twenty-four and one-fourth feet deep. In 1912, while the Davis lock was under construction, Congress ordered another lock of the same size and parallel to it. This fourth lock was completed in 1918.



SAULT STE. MARIE CANAL

1. Weitzel Lock
2. Poe Lock
3. New Third Lock
4. New Fourth Lock
5. Canadian Lock
6. Power Canal

These locks can accommodate two of the largest lake steamers at once, and can be filled or emptied in six minutes. During the season of navigation there is scarcely an interval of ten minutes, day or night, when there are not boats in one or more of these canals. During the season of 1917, a period of 237 days, 19,569 steamships, 1,943 sailing vessels and 1,373 unregistered vessels passed through the canal. During the season of 1916 the number of steamers was 21,606, and of sailing vessels, 2,421. Close to 100,000,000 tons of freight pass every year through the Canal. See CANAL.

SAUNDERS, MARGARET MARSHALL (1861–), author, was born at Milton, Nova Scotia. Miss Saunders has traveled extensively and takes an active part in philanthropic work. Her best known book is *Beautiful Joe,* which has been translated into many foreign languages. Among her other books for children are *Charles and his Lamb, Tilda Jane, Beautiful Joe's Paradise, Nita, The Story of an Eskimo Dog, Princess Sukey* and *My Pets.* Her stories are remarkable for their sympathetic treatment of dumb animals.

SAUSAGE, *saw'sayj,* a food consisting of finely-chopped meat mixed with potato flour and seasoned with salt and spices. Sausage of the packing houses is made chiefly of trimmings, particularly those of the head and hoof, and its manufacture is one of the most profitable branches of meat-packing. The work is all done by machinery. After the meat is chopped it is mixed with an equal part of potato flour, and enough water is added to allow the mixture to be easily worked. Sage, pepper, ginger and mustard are the spices generally used. Salt is added to suit the taste, and most of the sausage is packed in casings made of the intestines of the slaughtered animals. As the casings are filled, they are divided into links, hence the name "link sausage." Home-made sausage is made wholly of meat.

There are numerous varieties of sausage, the difference between them consisting chiefly in the seasoning and the manner of packing. But in some varieties, such as Bologna, smoked meat is used. Among Europeans the Bologna sausage of Italy and the smoked sausage of Germany are highly esteemed. Besides these varieties, Frankforts and wienerwursts are common in American markets.

SAVAN'NAH, GA., the county seat of Chatham County, on the Savannah River, fourteen miles from the ocean, 260 miles

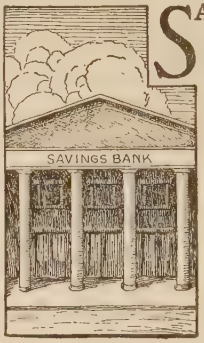
southeast of Atlanta and 768 miles by steamer from New York City. It is on the Southern, the Atlantic Coast Line, the Seaboard Air Line, the Central of Georgia, the Savannah & Northwestern and the Savannah & Statesboro railroads. It has sometimes been called "the Forest City," from its ornamental shrubbery and luxuriant shade trees; according to government statistics Savannah has more park space than any other city in the United States, in proportion to size. There is a fine statue to Confederate dead in the Parade Ground, an extension of Forsyth Park.

The city has free kindergartens, several private schools and colleges, public libraries for white and colored people, including a Carnegie Library, and Telfair Art Gallery. There are numerous charitable institutions, including the Savannah and the Saint Joseph's hospitals, the Georgia infirmary for colored people, the Episcopal orphans' home, Oglethorpe Sanitarium and Telfair Hospital for women. There are many churches, some in the old colonial style of architecture. On the site of Christ Church, John Wesley founded the first Sunday school in America. Other prominent buildings are a courthouse; a Federal building; a union passenger station; Hodgson Hall, containing the library and collection of the Georgia Historical Society; and numerous business buildings ranging from eight to fifteen stories.

The surrounding country produces rice, cotton, sugar cane, vegetables and fruits, and truck gardening is very extensively carried on near the city. The manufacturing industry is of recent development, but of very rapid growth. The products now include fertilizers, lumber and its products, car wheels, shirts and overalls, tin cans, cottonseed oil, crates and boxes, candy, brooms, baking powder, cigars, ice, sash and blinds. The city has a very large trade, both coastwise and foreign, and exports cotton, rosin, spirits of turpentine, lumber and timber, phosphate rock, fruits, vegetables and various manufactured goods. There are excellent terminal facilities for freight handling.

Savannah was settled in 1733 by a small company under the leadership of Gen. James Edward Oglethorpe. During the Revolution the town was fortified by the Americans, but was captured by the British in 1778 and held until the end of the war. It was chartered as a city in 1789. The first steamship which crossed the Atlantic set sail from here, was owned by Savannah people and was called the *Savannah*. At the time of the Civil War the city had about 25,000 people. It was the end of General Sherman's famous march to the sea and was surrendered after a brief defense and the destruction of the navy yard (Dec. 21, 1864). Since 1900 the boundaries of the city have been extended, bringing within the city limits several suburbs. Population, 1910, 65,064; in 1917, 69,250 (Federal estimate), of which over one-third is colored.

SAVANNAH RIVER, a river 550 miles in length, formed in South Carolina by the union of the Tugaloo and the Kiowee. It flows in a southeast direction into the Atlantic Ocean, forming a part of the boundary between Georgia and South Carolina. It is navigable for large steamers as far as Savannah and for smaller steamers to Augusta, about 230 miles, while the smallest crafts ascend for 150 miles farther inland.



SAVINGS BANKS, institutions organized for the accumulation and use of small sums of money. They originated about the middle of the eighteenth century, though they had been suggested at an earlier date. The first bank of the kind was established at Brunswick, Germany, in 1765. The chief purpose of such institutions was originally, and has continued to be, the providing of facilities for the safe keeping of small savings, which the larger banks could not profitably handle.

The first savings bank established in the United States was the Philadelphia Saving Fund Society, which was founded in 1816 and chartered in 1819. Others soon arose, and their number has rapidly increased.

There are two classes of savings banks in the United States. These are *mutual* banks, which are owned by the depositors, and *stock* banks, owned by the stockholders. The minimum rate of interest and the nature of the investments which both classes are allowed to make are regulated by state laws. While these banks have more than 11,000,000 depositors and care for over $5,000,000,000, the greater part of the savings funds are cared for by the savings departments of the regular banks.

Postal Savings Banks. The first postal savings banks were established in England in 1861. Other European countries soon followed England's example, but in the United States such banks were not established until 1910.

Anyone ten years of age or over can open an account in a postal savings bank in his or her own name on depositing one dollar, or any multiple of that sum, provided that not more than $100 be deposited by the same person within one month. Those who wish to begin saving with sums less than one dollar have the privilege of purchasing special savings bank stamps at ten cents each. The first purchase is a ten-cent card, and to this the stamps are attached until their value reaches one dollar, when the card may be canceled and an account be opened. Funds may be withdrawn at any time. Interest is computed only on even years and on even dollars. No depositor can have over $1,000 to his credit. When his deposits reach this amount, he can convert his deposit into government bonds paying the same rate of interest, if he so desires, and at any time, by notifying the secretary of the treasury, a depositor can convert his funds into such bonds in sums as low as $20. Since the establishing of these banks millions of dollars before hidden away for safe keeping have been deposited with the government, and have found their way into the channels of trade. In 1916 the postal savings banks law was extended to Alaska, and within the year the savings there amounted to $330,000. The five leading cities in deposits in 1918 were:

New York	$29,764,908
Brooklyn	9,536,745
Chicago	6,988,701
Detroit	4,207,814
Boston	3,011,264

School Savings Banks. School savings banks have been in existence in Europe for more than a century. They were established in the United States in 1885. The customary plan is for the school to receive the savings of the pupils and place the total sum in a savings bank. When a pupil's savings amount to one dollar an individual account is opened for him. Money cannot be withdrawn except with the written consent of the parent or guardian. Millions of dollars have been saved by pupils in the public schools since the opening of these banks. Such institutions have been established in Canada since 1906.

SAVINGS BANKS, CANADIAN. Since Confederation the Canadian government has conducted two kinds of savings banks. The first of these, known as the Dominion government savings bank, was established by the Maritime Provinces and was assumed by the Dominion after Confederation. As far as possible the accounts in these banks have been transferred to the postoffice savings banks. This postal savings system is nothing more or less than a national savings bank conducted by the postoffice department. Money is deposited just as in any bank and interest at three per cent is paid on deposits. Any person may have a deposit account—the accounts of children, however, are protected by special regulations. The total deposits made by an individual in each fiscal year (ending June 30) may not exceed $1,500 and the total balance, exclusive of interest, to the credit of any account is limited to $5,000.

A depositor in any of the savings bank postoffices may continue his deposits at any other such offices and he may withdraw money at that office which is most convenient to him. For instance, if he makes his first deposit at the savings bank at Regina, he may make further deposits at, or withdraw his money through, the postoffice at Moose Jaw, Banff, Winnipeg or any place that may be convenient to him, whether he still lives at Regina or has removed to some other place. In 1911 there were over 1,100 postoffices holding a total of $11,000,000 in savings deposits.

There is a third class of government savings bank; this is known as the "school savings" or "penny savings" bank. The Penny Bank of Toronto, with total deposits of $150,000, was the first one to be founded. It has a charter from the Dominion government, granting the right to receive school savings from any part of the Dominion. These savings, according to statute, must be deposited with the government.

SAVONAROLA, *sav o na ro'la,* GIROLAMO (1452–1498), a noted Italian reformer, was born at Ferrara. At an early age he joined the Dominican Order and entered their convent at Bologna, where he became professor of philosophy and theology. He began preaching in 1482 at Ferrara, but soon went to Florence, where, in 1491, he was elected prior of Saint Mark's. Having persuaded himself that he was prophetically inspired, he assumed to foretell impending calamities. He

was intensely enthusiastic and earnest in his efforts to reform the very lax morals of the period.

Feeling that the Church required purification, he fearlessly assailed Alexander VII, who was then pontiff. In 1494, when Charles VIII invaded Italy, Savonarola went to him and by the religious fervor of his appeal had Florence spared from invasion. He took a prominent part in framing the constitution of the Florentine Republic and opposed the pretensions of the Medici to regain the dominion of Florence, proclaiming death for those who conspired against the Republic. The Medici had strong influence at the Vatican, and used it against Savonarola. Although he continued his clerical duties for a time, he soon lost his hold upon the people of Florence. On April 9, 1498, he and two of his associates were thrown into prison. Six weeks after their arrest they were executed. In the interval between his condemnation and death, Savonarola devoted himself to prayerful preparation. Savonarola's writings consisted of sermons, theological works and a treatise on the government of Florence.

SAVONAROLA

SAVOY, House of, the oldest reigning European dynasty, now the ruling house of the kingdom of Italy. Its members are descendants of Humbert, first Count of Savoy, who lived between 1003 and 1056. Since 1416 they have been dukes of Savoy, kings of Sardinia since 1720, and kings of Italy since 1861. For history of the dynasty, see Italy, subhead *History.*

SAW, a tool made of a thin band or disk of steel, and used in cutting wood, stone, ivory and metals. One edge of the saw is cut into teeth. The shape of the teeth divides saws into two classes, crosscut and rip, and each class has many sizes and shapes. The *crosscut saw* has teeth for cutting across the fiber of the wood. They are triangular and are sharpened on both sides, coming to a sharp point. The *rip saw* is designed for cutting lengthwise the fiber, and the teeth have one edge vertical to the edge of the saw and the other slanting. They are sharpened so as to have an edge like a chisel. In all saws, the points of the teeth are bent slightly outward so that the portion of wood, or *kerf,* cut by the saw will be a little wider than the thickness of the blade.

Circular saws are found in sawmills, where they cut most of the lumber prepared for market, and in wood-working factories. Some of these saws in lumber mills are seven feet in diameter. They are operated by water, steam or electric power, and will cut 200 feet of wood, board measure, per minute. A *band saw* consists of a band of steel with teeth on one edge, and stretched over two pulleys like a belt. Band saws are used for cutting barrel staves and thin parts of furniture. *Gang saws* are straight saws set in a frame that has an up and down motion. They are used in large sawmills. The distance between the saws is equal to the thickness of the lumber desired. One of these gangs will saw an entire log into boards in the time that a single upright saw would cut one board. The crosscut saw is a thin band of steel with a handle at each end for the workmen to grasp. It is used in felling trees and sawing logs. *Meat saws* have a thin, narrow blade fastened to an iron frame; the teeth are fine. Saws for cutting metal are of a similar design. The blades are tempered so that they are very hard.

A CIRCULAR SAW
Rip saw used in a machine saw.

SAWFISH, a fish of the ray family whose chief characteristic is the possession of long swordlike snout, with spines projecting like teeth on both edges, forming the "saw." It

is a large fish, and specimens taken off the Atlantic coast of the United States have measured fifteen feet in length. The saw is some-

SAW FISH
Under surface of head of fish.

times six or seven feet long and a foot wide at the base. It is a powerful weapon and the fish uses it to tear open the bodies of its victims. The mouth on the under surface of the head has rough, flat teeth, used for crushing the food.

SAW FLY, a large family of insects, so called because the female is armed with a number of sawlike organs with which she perforates the stalks and other parts of plants for depositing her eggs. The fluid injected into the perforation causes a gall-like swelling, where the larva lives. Different species infest different plants, and the larvae are destructive in different ways; though they may practically disappear for several years at a time, they again become very numerous and do much damage to wheat, turnips, currants and other crops.

SAXE, *sax,* JOHN GODFREY (1816–1887), an American humorous poet, journalist and lecturer, born at Highgate, Vt. He practiced law for a time, but abandoned this for a literary career. His claim to fame rests upon his humorous poems included in *Progress,* a satirical poem; *The Money King; The Flying Dutchman; Fables and Legends of Many Countries* and *Leisure-Day Rhymes.*

SAX'IFRAGE, the popular name of a genus of plants, many of which grow in stony soil. All species are inhabitants of highland regions of the cold and temperate parts of the northern hemisphere. Most of them have tufted foliage and panicles of white, yellow or red flowers, and many are well known as ornamental plants in gardens. The best known species are the *beefsteak,* or *strawberry, geranium,* imported from China; *the golden saxifrage,* and the *swamp saxifrage.*

SAX'ONS, a warlike Germanic people who in the fifth and sixth centuries invaded Britain and laid the foundation for the Saxon kingdom in the island. A part of the people remained on the continent, where they had spread over what is now Northwestern Germany as far as the Elbe. They were conquered by Charlemagne, who forced them to embrace Christianity. The German state, Saxony, takes its name from the Saxons who originally inhabited that part of Europe.

SAX'ONY, a kingdom of the former German Empire, whose ruler, Friedrich August II, abdicated in November, 1918, at the time of the revolution which overthrew the imperial German government. Thereupon a democratic government was established in Saxony, which became one of the states of the German republic. Saxony is situated in the eastern part of Germany, and is bounded on the southeast and east by Czecho-Slovakia. Prussia, Reuss, Saxe-Weimar, Saxe-Altenburg and Bavaria are the German states which border upon it. The area is 5,789 square miles, and the population is over 3,000,000. Leipzig, Dresden, Chemnitz and Plauen are the chief cities.

The state is traversed by the Elbe River, and has several ranges of mountains with rich mines of silver, iron, coal and other minerals. About one-fourth of the country is covered with forests. Abundant crops of potatoes and cereals are harvested, and the state is also a prosperous manufacturing region. At Meissen is a state porcelain factory which produces the famous Dresden china; Leipzig is a world center of printing and publishing.

History. The name Saxony was originally given to the country in which the Saxons dwelt. These people were conquered by the Franks in 785 and were completely subjugated within the next twenty years. Later the Saxons and most of their country were incorporated into the empire of Charles the Great. Owing to the attacks by Slavs and Northmen the people organized the country into divisions called *marks,* for the purpose of mutual protection. These were governed by dukes, one of whom, with his descendants, extended his power over the entire region known as Saxony and thus formed the old Saxony duchy. In 919 Henry, the ruler of this duchy, was elected king of Germany and his family ruled the country until 1024. During the Middle Ages the kingdom formed various alliances and was ruled by a number of different families.

At the breaking out of the Reformation the country was ruled by Frederick the Wise, who was an intimate friend of Luther and

who used his influence to establish Protestantism in Saxony and other German countries. In this he was measurably successful, and his son and successor continued the work and finally secured the triumph of Protestantism in Germany; but during the Thirty Years' War Saxony lost its position as the leading Protestant German state. Late in the seventeenth century Frederick Augustus, who was at that time emperor, also became king of Poland and joined Peter the Great and the king of Denmark in an attempt to overthrow the government of Sweden. The failure of this attempt was disastrous to Saxony and left the country nearly bankrupt.

In 1735 Saxony became involved in the War of the Austrian Succession, from which it did not escape without financial disaster. In 1806 the ruler, Frederick Augustus I, became an ally of Napoleon, who in the following year conferred upon him the duchy of Warsaw, but after the overthrow of Napoleon at Leipzig Augustus was deprived of more than half of his kingdom, which was awarded by the Congress of Vienna to Prussia. In 1866 Saxony joined Austria in the Seven Weeks' War and as a result was compelled to become a member of the North German Confederation; in 1871 it became a member of the German Empire. See GERMANY; WORLD WAR.

SAXOPHONE, *sax'o fohn,* a brass musical instrument invented by Adolph Sax, from whom it takes its name. The saxophone has a deep tone and is used principally in military bands. In consists of a conical tube turned upward at the bottom, and having a small part turned backward at the top. The mouthpiece contains a reed similar to that used in a clarinet. There are twenty keys arranged on the tube, which are played by the first three fingers of each hand.

SCAB, or **SCABIES,** *ska'be eez.* See MANGE.

SCALE, in music a succession of notes arranged in the order of pitch, and comprising those sounds which may occur in a piece of music written in a given key. In its simplest form the scale consists of seven steps or degrees, counted upward in a regular order from a base note (the tonic or keynote), to which series the eighth is added to form the octave. The scale having C for its keynote is the natural, or normal, scale. The *diatonic scale* ascends by five steps (tones) and two half steps (semi-tones), taking for the names of the notes the syllables do, re, mi, fa, sol, la, ti, do; the two semitones occur between E and F (mi and fa) and B and C (ti and do). When the scale is graduated all the way by a series of twelve half-steps, or semitones, it is called the *chromatic scale.* A scale is said to be *major* when the interval between the keynote and the third above it, as from C to E, consists of two tones; it is called *minor* when the interval between the keynote and its third, as from A to C, consists of a tone and a half. See MUSIC.

SCALE INSECT, or **BARK LOUSE,** one of a large number of different species of insects which attach themselves to all parts of plants, where they remain in order to suck the juices. They are very small and cover themselves with scales, which are either naked or covered with cottony down or hair. Some species are serious pests and affect not only choice garden and hothouse plants, but also the fruit-bearing trees and shrubs. Of the 1,400 or more known species, almost 400 are prevalent in America. An emulsion of kerosene or crude petroleum will usually control the pest when the insects are young. See LAC.

SCALES, thin, flat membranous or horny plates, usually overlapping, which form the covering of certain animals, especially fishes. Some lizards and serpents also are covered with scales, and a few mammals, notably a species of anteater. Scales vary in shape, size and arrangement, according to the genus of animal.

In botany, the word *scale* is applied to small, bracted leaves, scalelike in form, whose function seems to be that of protecting the more delicate plant organs. A common instance is found in the scales which protect the leaf buds during the winter.

SCALLOP, *skol'lup,* the common name of a genus of mollusks related to the oysters. There are numerous species, of which the common and great scallop are the most familiar forms. The latter is esteemed a delicacy in the markets of London. It was a shell of this species that in the Middle Ages was carried in the hats of pilgrims as a token of their pilgrimage to the Holy Land. The shell is somewhat rounded and ends in a triangular ear, in which the hinge is placed. Two species of scallop are found along the Atlantic shores of North America.

SCALP, the outer covering of the top and back part of the skull. It consists of the

skin, which, with the exception of the growth of hair, differs little from ordinary skin; the tendon of the muscle that wrinkles the forehead horizontally and moves the scalp; cellular tissue, and blood vessels. Injuries to the scalp, especially severe burns, often result in erysipelas and inflammation. The word *scalp* is also applied to the circular piece, about four inches in diameter, taken by the Indian from the crown of the head of his victim. In 1755 Massachusetts offered £20 (about $100) for the scalp of an Indian woman or child and £40 for that of a male. During the Modoc War in 1873 scalps were taken by the troops.

SCAMMONY, *skam'o ni,* a climbing, twining plant which grows in abundance through Syria and Asia Minor. It resembles the common bindweed, though larger, and has a stout tap root, from which a common drug is taken. Scammony is blackish-gray, with a nauseous smell and a sharp, bitter taste, and is given in medicine where a strong cathartic is needed.

SCAMMONY

SCANDINA'VIA, the name formerly applied to the kingdoms of Norway, Sweden and Denmark or of Norway and Sweden alone, and still frequently used in referring to these countries. It is also the name of the peninsula containing Norway and Sweden. The term now has no political significance. See DENMARK; NORWAY; SWEDEN.

SCAPEGOAT, *skayp'goht,* in the Jewish ritual, a goat which was brought to the door of the tabernacle, where the high priest laid his hands upon him, confessed the sins of the people and transferred them to the head of the goat. The animal was then sent into the wilderness, bearing the iniquities of the people. In modern phraseology the word is used to designate an innocent person who is made to bear the blame of others.

SCAP'ULA. See SKELETON.

SCARAB, *skair'ab,* the sacred beetle of the Egyptians, sometimes called *dung beetle,* from its habit of enclosing bits of refuse into pellets and using them as food. Scarabs were believed to resemble the shape and

SCARABS

luster of the sun and to symbolize immortality. Figures of it, plain or inscribed with characters, were employed as amulets and seals. Large numbers of these scarabs, made of hard stone or gems, are still to be found in Egypt.

SCARLET FEVER, a very contagious disease that is often fatal and that frequently leaves serious disorders of the system in its train. It begins with something like an ordinary cold, with sore throat, which is, however, followed by a high fever and scarlet eruptions on the body. One variety of the disease is very light, while another is more severe, and in a third form the symptoms increase in violence with great rapidity, and the disease proves fatal within two or three days. In a majority of cases the fever begins to fall after the fifth day, and the recovery thereafter is gradual. Not infrequently death occurs as a result of complications, rather than of the disease itself. Dangerous diseases of the kidneys supervene, and inflammations which may result in deafness and in loss of the power of speech, as well, form often in the throat or in the inner ear. The appearance of kidney complications is usually noticed in that stage of the disease during which the flakes of skin are peeling off, and at this time dropsy is frequent.

A person suffering from scarlet fever is peculiarly liable to the infection of bacterial diseases, and pneumonia and diphtheria frequently follow. Scarlet fever is not strictly a disease of childhood, though comparatively few adults have it. From its seriousness it is evident that each case should be carefully treated and that the patient should also be guarded against cold or infection from any other disease throughout his convalescence. From its peculiar contagiousness, it is evident that each case should be carefully isolated and that thorough disinfection should follow recovery. The germs have been known to remain active in clothing and elsewhere for

a long time. It should be remembered, too, that the contagion is active during that stage of the disease when the body is shedding the poisonous scales. The child should be kept away from others for six or eight weeks, in order that it may be certain that he is not a source of infection.

SCHELDT, *skelt,* a river of Belgium and the Netherlands, 250 miles in length, rising in the French department of Aisne and flowing in a northerly and then northeasterly direction, merging with the Rhine delta and opening into the North Sea. About fifteen miles below Antwerp it divides into the East Scheldt and the West Scheldt, forming a double estuary and enclosing the islands of South Beveland, North Beveland and Walcheren. It is one of the most important waterways of Europe, being navigable by means of a series of locks for 210 miles and connected by canals with the cities of Belgium and France. At Antwerp it has a breadth of 1,600 feet and forms a secure harbor for the largest ships. For 200 years previous to 1863, the Scheldt was in the hands of the Dutch, who levied a toll on all foreign vessels. In 1863 it was made a free waterway by the Treaty of Brussels.

SCHENECTADY, *ske nek'ta di,* N. Y., the county seat of Schenectady County, sixteen miles northwest of Albany, on the Mohawk River, on the New York State Barge Canal and on the New York Central and the Delaware & Hudson railroads, and electric lines. It is an important industrial city, with about 140 manufacturing establishments, producing electrical supplies, clothing, insulators, locomotives, foundry and machine shop products, brooms, brushes and many other goods. Union College is located here. Some of the prominent buildings are a courthouse, a city hall, an opera house, a Y. M. C. A., a Carnegie Library, a Federal building and a high school which cost $550,000. There are four parks aggregating about 190 acres. Schenectady was settled by Arent Van Corlear in 1662. The French and Indians massacred most of the inhabitants in 1690 and burned a part of the settlement. It was incorporated as a borough in 1765, and was chartered as a city in 1798. Population, 1910, 72,826; in 1917, 103,744 (Federal estimate).

SCHILLER, *shil'lur,* JOHANN FRIEDRICH CHRISTOPH VON (1759–1805), one of the greatest of German dramatists and poets, was born at Marbach, Württemberg. His father was superintendent of the woods and gardens attached to a residence of the duke of Württemberg, and the duke had the boy educated in a military academy, which he himself had founded at the castle of Solitude. Here Schiller studied jurisprudence; but when the school was removed to Stuttgart, and its scope became extended, he turned his attention to medicine. In 1780 he was appointed physician to a regiment in Stuttgart, and it was now for the first time that he had enough leisure and freedom to finish his tragedy of *The Robbers,* begun three years previously. He published this piece at his own expense in 1781; it attracted an immense amount of attention, and in 1782 it was performed at Mannheim. Arrested for attending the performance without leave of the Duke of Württemberg, and forbidden by the same despotic authority to write plays, Schiller fled from Stuttgart and settled at Mannheim, as poet to the theater. Here the plays of *Fiesco* and *Cabal and Love* were soon afterwards produced.

SCHILLER

In 1785 he went to Leipzig and Dresden, where he studied the history of the times of Philip II, to prepare himself not only to write his drama of *Don Carlos,* which appeared in 1787, but also to publish a *History of the Revolt of the Netherlands.* Visiting Weimar in 1787, he received a friendly welcome from Wieland and Herder, and later he made the acquaintance of Goethe, with whom he formed a close friendship. Goethe secured for him a professorship at Jena, and here he lectured on history and published *Historical Memoirs from the Twelfth Century to the Most Recent Times* and his *History of the Thirty Years' War.* It was then, also, that, through the influence of Goethe, he returned with renewed ardor to poetry and produced his finest lyrical poems and ballads. Among these are *The Diver, The Cranes of Ibycus, The Glove* and *The Song of the Bell,* the finest of German lyrics. It was after 1798 that he published in succession the dramas of *Wallenstein, Maria Stuart,* the *Maid of Or-*

leans, the *Bride of Messina* and *William Tell,* this last his greatest work. In 1802 he was raised to the rank of nobility. In German literature Schiller stands second only to Goethe, and his works are perhaps read more than those of Goethe.

SCHILLING, *shil'ing,* JOHANNES (1828–1910), a German sculptor, born at Mittweida, Saxony. He studied art at Berlin, Dresden and Rome, and in 1868 became professor at the Dresden Royal Academy. His chief works include his masterpiece, the *German National Monument,* on the Niederwald, opposite Bingen on the Rhine; the *Four Seasons,* at Dresden; a statue of Schiller, at Vienna; and the *War Memorial,* at Hamburg.

SCHLESWIG - HOLSTEIN, *shlais'viK hole'stine,* the name applied to two provinces lying south of Denmark which were ceded by that country to Austria and Prussia in 1864, and which Prussia seized from Austria in 1866. The territory was incorporated in the German Empire as a province of Prussia in 1871, and remained a part of Germany without division until 1919. According to the peace treaty imposed on Germany by the victorious allies plebiscites (votes) were to be taken in three zones to determine which part of the province should revert to Denmark. It was expected that part of Schleswig would vote for reunion with the Danish kingdom.

The area of Schleswig-Holstein is about 7,340 square miles, or a little less than that of New Jersey. Schleswig is the northern part and Holstein is the southern part. Schleswig-Holstein forms a part of the same peninsula with Jutland, to which, in its general character, it bears considerable resemblance. There are extensive moorlands; the west coast consists of sandy and marshy flats, protected in Schleswig by chains of hills and in Holstein by lofty dikes. The east coast is scooped out into natural harbors. The principal streams flow to the west, toward which for the most part the country slopes in gradual stages.

In the tenth century and the early part of the eleventh century, Schleswig formed part of Germany, but in 1027 it was ceded to Canute of Denmark. In the thirteenth century it was made a duchy, under the control of Denmark, and late in the fourteenth century it came under the control of the count of Holstein. When in 1460, on the extinction of the Holstein dynasty, Schleswig-Holstein chose Christian I of Denmark as ruler, provision was made that they should never be separated from each other or be incorporated with Denmark. Although thus closely united, the two duchies differed widely from each other, Holstein being almost completely German, and Schleswig, Danish.

A proclamation of the Danish king, issued in 1848, that Schleswig was to be incorporated with Denmark, brought on a rebellion throughout Schleswig-Holstein, which was aided by Prussia and other German states. Denmark was defeated, and in the following year, when hostilities began again, the Danes were a second time driven from Schleswig. In 1851, however, Prussia and Austria again entered the struggle, this time on the side of Denmark, and the result was the suppression of all revolt.

Bismarck in 1864 induced Austria to join with Prussia in an attempt to compel Denmark to withdraw Danish rule from Schleswig-Holstein, and when Denmark refused, open war began. The result was the defeat of the Danes and the cession of Schleswig and Holstein to Austria and Prussia. By a treaty between these two nations, Schleswig was placed under the control of Prussia, while Austria regulated affairs in Holstein. As Bismarck had expected, the differences between Austria and Prussia over the management of the duchies led, in 1866, to war (see SEVEN WEEKS' WAR), the outcome of which was the union of Schleswig-Holstein with Prussia. See GERMANY; WORLD WAR.

SCHLEY, *sly,* WINFIELD SCOTT (1839–1911), an American naval officer, born in Frederick County, Md., and graduated from the United States Naval Academy in 1860. He fought in the Civil War, and afterwards taught in the Naval Academy. His first noteworthy achievement was his rescue of the Arctic explorer Greely. Greely had gone north with his expedition in 1881, and had not been heard from for two years. Schley, then a commander, volunteered his services as head of the relief expedition, which set sail in 1884, found Greely and six of his followers and brought them back. A gold medal was awarded him in recognition of this service, and two years later he was made a captain.

In the course of a command at Valparaiso, Chile, some of his crew were killed by natives, and Schley negotiated a satisfactory settlement with the Chilean government.

After serving several years as lighthouse inspector, he was promoted to the rank of commodore, and in 1898 when war was declared with Spain he was placed in command of the Flying Squadron. In the temporary absence of Rear-Admiral Sampson occurred the Battle of Santiago, and Schley, in command of the blockade, destroyed the Spanish fleet. He was promoted to the rank of rear-admiral.

WINFIELD SCOTT SCHLEY

After the close of the war a number of statements derogatory to Admiral Schley's conduct during the war were made by officers of the navy, and Schley requested the Secretary of the Navy to have these charges investigated. The court criticised Schley's management of the squadron at the beginning of the war, but commended his conduct in the battle with the Spanish fleet, and no further action was taken.

Admiral Schley was a member of the commission which directed the evacuation of Porto Rico. After serving two years as commander of the South Atlantic squadron, he retired.

SCHMALKALDIC LEAGUE, *shmal kahl'dik*, a league entered into at Schmalkalden in 1531, by several Protestant princes and free cities, in common defense of their faith and political independence against Emperor Charles V and the Roman Catholic states. Among the organizers were the elector of Saxony; his son, John Frederick, and Philip of Hesse. The rulers of Saxony were empowered to manage its affairs. In the war of the Schmalkaldic League against Charles V (1546–1547), Charles was at first successful. In his victories he was aided by Maurice of Saxony, who had been a member of the Schmalkaldic League, but who, tempted by the promise of the electorate of Saxony, had gone over to the side of the Emperor. At Mühlberg (1547), the Protestant forces were totally routed, and both the elector and Philip of Hesse fell captive to the Emperor. At this juncture, however, Maurice returned to his former allegiance and organized a revolt. Making an alliance with Henry II of France, he led the League again into the field and by several successive victories forced the emperor to grant the Treaty of Passau, in 1552, guaranteeing absolute freedom of worship to the Protestants. See Reformation, The.

SCHOFIELD, *sko'feeld*, John McAllister (1831–1906), an American soldier, born in Chautauqua County, N. Y. After graduation from West Point he taught there and at Washington University, Saint Louis, Mo., and at the outbreak of the Civil War entered the Union service as major of the First Missouri Volunteers. Later in the year he was appointed brigadier-general, and afterwards was placed in command of the Missouri militia. The following year he was made major-general of volunteers and rendered conspicuous service to the Union in Sherman's Georgia campaign and in the Battle of Franklin. He was active in the campaign against Hood in Tennessee and later captured Wilmington, N. C. In 1868 he was appointed Secretary of War to succeed Edwin M. Stanton; in 1869 was made major-general of the United States army, later was appointed general in chief, and was made lieutenant-general by President Cleveland in 1895, but retired the same year. He wrote *Forty-Six Years in the Army*.

SCHOLASTICISM, *sko las'ti siz'm*, the philosophy taught by the teachers of the Middle Ages, who were called Scholastics, or Schoolmen, because their philosophy originated in schools established by Charlemagne and others for the education of the clergy. Scholasticism attempted to harmonize the tenets of the Church with the logic of Aristotle, just restored to Europe by the Saracens. Among the most distinguished of the thirteenth-century exponents of scholasticism were Albertus Magnus, Roger Bacon, Duns Scotus and Saint Thomas Aquinas. The movement awakened the mental life of Europe and prepared the way for the Renaissance.

Related Articles. Consult the following titles for additional information:
Aquinas, Saint Thomas
Bacon, Roger
Duns Scotus
Renaissance

SCHOOL DISTRICT, the smallest political division for any governmental purpose, except some city wards. It is a political section devoted wholly to education, and in rural communities is usually two miles square. It approaches closer than any other unit to a pure democracy, for all adult residents are

qualified to participate in its annual meeting. The officers of a school district are called trustees, are usually three in number, and one is elected each year.

Some children in studying geography may well begin with the school district, because it is small and the facts respecting it can be readily comprehended. The outline for study may be somewhat like that given below:

The School District

(a) Political features
  (1) Map
  (2) Location in township
  (3) Numbers or names of surrounding districts
  (4) Area (sections included)
  (5) Roads
  (6) Population
  (7) School population
(b) Physical features
  (1) Rivers
  (2) Creeks
  (3) Valleys
  (4) Plains
  (5) Hills or mountains
  (6) Swamps

SCHOOL GARDEN. The school garden movement is international in scope. In Europe the cultivation of small plots of ground by pupils has long been an established feature of the school systems, and within recent years the idea has found widespread favor in both the United States and Canada. In the former country the Bureau of Education in 1914 inaugurated a plan of school-directed gardening that proved very successful. The plan consisted in enlisting boys and girls of elementary school age in systematic garden work on available ground in backyards, vacant lots or school yards. Teacher directors were appointed to supervise the work, and parents were urged to coöperate with the young gardeners in every way possible. In March, 1918, the name United States School Garden Army was adopted, and a special campaign for enlistments was begun. By May, 1919, 3,000,000 school boys and girls had joined the army. The following suggestions on plans of organization have been published:

Number of members in a company: Ten to 150.

Age limit: Any school child, but preferably the more important companies should be enlisted from the pupils above the third grade.

Requirements for enlistment: The signing of an obligation card in which the pupil agrees to raise one or more food crops and to keep records of his work and the results, reporting them to the teacher or garden supervisor. These cards will be furnished by the Bureau of Education.

Officers: Each company to have a captain and one or two lieutenants, the latter depending upon the number of soldiers enlisted.

Insignia: For the privates, a service bar with U. S. S. G. in red letters on a white background, with a border of blue. For the second-lieutenant, the same bar with one white star in the border. For the first-lieutenant, the same bar with two white stars in the border. For the captain, the same bar with three white stars in the border. For the garden teacher or supervisor, similar insignia without stars, with blue letters and a red border.

Enlistment of existing organizations: Any organization of school children now doing garden work will be eligible to enlistment. Such organizations may keep their existing form, if they so desire, and have the additional impetus of belonging to a national army fostered by the President, the Secretary of Interior and the Commissioner of Education. The aim of this army is to nationalize and unify the great work now being carried on among school children of America.

From the standpoints of health, economics and education, school gardening has much to commend it. It has been estimated that 5,000,000 boys and girls can produce in a season $250,000,000 worth of food, an important fact in view of destitute conditions in many parts of the world following the World War. Transportation congestion is also relieved through the consumption of products raised in the community. The young gardeners themselves are taught valuable lessons of thrift and economy, they gain practical experience in agriculture, and they learn many important facts in botany and zoölogy. Moreover, the work itself is healthful and invigorating, and it brings the pupils close to the heart of the great teacher—Mother Nature.

See Boys' and Girls' Clubs; Gardening. For further information write to the Director of the School Garden Army, Washington, D. C.

SCHOOL SAVINGS BANKS. See SAVINGS BANKS.

SCHOOLS. In its broadest sense, the term *school* is used to designate a place where instruction is given in the arts, sciences, professions and ordinary vocations, and includes grammar schools, vocational schools, evening schools, high schools, academies, colleges, universities and technical schools. Most commonly, however, the name is restricted to institutions below college rank. The founders of America realized that the state must rely upon an educated citizenship for its continued existence. The only clause of the famous Ordinance of 1787 that is now remembered is the following:

Religion, morality and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged.

In pursuance of this policy the states erected out of this vast territory, and those from other territory as well, have organized and maintained an excellent system of public schools.

Schools, Consolidated. In many sections the one-room rural school is at a great disadvantage because of the small number of pupils and lack of adequate funds for its support. Because of these disadvantages many families send their children to some near-by town where they can have the advantages of a graded school. Many of these children acquire a liking for town life, and when grown up they depart for the city.

To meet the demand of rural communities for schools equal to those in the towns, the plan of consolidating a number of adjoining school districts with small schools into a single district, and establishing one school with enough pupils and money to make it equal to the town school in equipment and efficiency, has been successfully carried out.

Many states now have laws providing for the consolidation of rural schools, and these laws make provision for transporting the pupils to and from school at the districts' expense. In many places graded schools have been established, and schoolhouses equipped for domestic science and manual training have been erected. Moreover, these schoolhouses contain assembly rooms where lectures and other entertainments are given, and the schoolhouse becomes the community center for many activities that enrich rural life.

Correspondence Schools, educational institutions in which instruction is given to pupils by mail. This system of education is the result of a general demand for the extension of higher instruction to many persons who are unable to attend high schools, normal schools or colleges. It is especially intended for students of small means, who are prevented by financial or other considerations from continuing their studies beyond grammar school or high school courses. By means of the correspondence school a person employed may continue his studies, or pursue a course of training that will prepare him for a different vocation. Many men and women holding positions of responsibility owe their advancement to the training they received through a reputable correspondence school.

The movement which gave correspondence schools a sanction in the United States was inaugurated in 1895 by President William R. Harper, of the University of Chicago. Dr. Harper declared that he could teach Sanskrit by mail as effectively as in the classroom. Later the university established a correspondence department, in which a student can take a part of any course by correspondence and receive credits for the work completed, but he must complete his course at the university. Following the example of the University of Chicago, other universities established correspondence departments, and the University of Wisconsin has extended its field to cover practically every occupation and the educational needs of any citizen in the state.

While instruction by correspondence may be given in nearly all lines of study, it is most successful when applied to industrial subjects, and by far the largest number of correspondence students are pursuing subjects pertaining to some line of industry.

Secondary Schools, schools ranking in grade between the common schools and the colleges. In the United States they include high schools, academies, and seminaries whose courses of study do not extend beyond preparation for college. The high schools are under city or township control, and in the newer states the most advanced are affiliated with state universities, so that their graduates can enter those institutions without examination (see HIGH SCHOOL). Academies and seminaries are usually under denominational control. Many of these schools maintain, in addition to a college preparatory course, departments in commerce and finance, art and music. The secondary schools of Germany are known as *realschulen.*

Related Articles. A complete list of the topics connected with the subject will be found at the end of the article EDUCATION. See also, HIGH SCHOOLS.

SCHOOLS, MILITARY. See MILITARY SCHOOLS.

SCHOPENHAUER, *sho'pen how er,* ARTHUR (1788–1860), one of the foremost philosophers of the nineteenth century, who originated a system which has become the classic of philosophical pessimism. Taking Kant as his point of philosophical departure, he attempted to reconcile the two contradictory elements in Kant's system—idealism and realism—by defining Kant's "thing-in-

itself" as *will* and regarding it as the "only necessary reality in the universe." By "will" he means not conscious choice, but blind, unconscious force which aims at no rational end. He holds that there is no ground for hope that things will be better; therefore it is the highest wisdom to adopt an attitude of resignation—to relinquish all desire, all aspiration and passively acquiesce to inevitable circumstance. The position is closely akin to the ancient Hindu idea of Nirvana (see BUDDHISM).

Schopenhauer was born at Danzig, Prussia, the son of a wealthy banker, and was educated at the universities of Göttingen and Jena. Between 1814 and 1818 he lived at Dresden and there wrote his celebrated work, *The World as Will and Idea.* After travels in Italy he went to Berlin in 1820, and there attempted to lecture in competition with Hegel, who was then a favorite. Failing to gain coveted recognition, he retired in morose disappointment to his home at Frankfort-on-the-Main, and there, except for short intervals, spent the rest of his life.

SCHUBERT, *shoo'burt,* FRANZ (1797–1828), one of the great masters of music, possibly the greatest song-writer who ever lived. He was born at Vienna, of a musical family, from whom he learned the rudiments of violin and piano playing. His mastery of music came, however, chiefly through independent study of the masterpieces and through association with a brilliant group of fellow musicians. Schubert's was a radiant personality; he was blessed with a large circle of loyal friends, and these constituted almost the only external compensation in a life of terrible drudgery, poverty and cruel disappointments. Lack of proper recognition for his work reduced him to the necessity of teaching school. Composing was done in spare moments and in feverish haste.

SCHUBERT

No other composer has been known to work with sustained effort at such incredible speed. In the course of his short life he produced more than six hundred songs, including the immortal *Erlking,* the popular *Hark, Hark the Lark,* and *Who Is Sylvia, Wanderer* and *Serenade;* ten symphonies; fifteen operas besides a large number of miscellaneous works for violin, piano or voice. His *Symphony in C Major* and *Unfinished Symphony* are among the imperishable masterpieces of music.

Liszt called Schubert the most poetic musician that ever lived; and Schumann said, "He has strains for the most subtle thoughts and feelings."

SCHUMANN, *shoo'mahn,* ROBERT (1810–1856), a celebrated German composer of songs and a pianist and musical critic, was born at Zwickau, Saxony. He studied law at Leipzig, but after 1830 devoted himself entirely to music. A noted pianist, Clara Wieck, daughter of his teacher, became his wife in 1840. In 1834 he founded the *Neue Zeitschrift für Musik,* a journal which for ten years exercised an important influence upon the development of music, giving loyal support to Chopin, Brahms, Berlioz, Schubert, Mendelssohn and other rising musicians. In the year following his marriage, Schumann wrote some of his finest songs and his first symphony. During a residence in Dresden, 1840 to 1844, he composed the cantata *Paradise and the Peri* and a quintet for the piano, and began his composition of the music for Goethe's *Faust.*

In 1850 the Schumanns moved to Düsseldorf, where, under stress of work, his mind failed him, and he died in a private asylum for the insane. Schumann ranks with Schubert as a composer of songs and with Chopin and Liszt as a master of piano technique. Many of his songs were written to poems of Goethe, Heine, Byron, Moore and others. An edition of his complete works, edited by his wife, includes thirty-four volumes.

SCHU'MANN-HEINK, *hynke,* ERNESTINE (née ROESSLER) (1861–), one of the foremost of German contraltos, was born near Prague, Bohemia, and educated in that city. At the age of seventeen she made her début at Dresden as Azucena in *Il Trovatore,* and for several years continued to sing in opera and concert. She was married in 1882 to a Mr. Heink, and ten years later to Paul Schumann. In 1905 she was married to William Rapp, Jr., from whom she was divorced in 1915. Madame Schumann-Heink made her first American appearance in 1898 as a member of the Metropolitan Grand Opera Company, New York. She has since appeared innumerable times in cities

throughout the United States before enthusiastic opera and concert audiences. She has been acknowledged one of the foremost singers of German *lieder* and interpreters of Wagner rôles.

SCHURMAN, *shoor'man,* JACOB GOULD (1854–), president of Cornell University. He was born at Freetown, Prince Edward Island. He won the Canadian Gilchrist scholarship and was graduated from the University of London; later he attended the Universities of Edinburgh, Heidelberg, Berlin and Göttingen. He became successively professor of philosophy in Acadia College and Dalhousie College, Sage professor of philosophy at Cornell, and in 1892 president of Cornell University. He was appointed chairman of the first United States Philippine Commission in 1899, and in 1912 and 1913 served as United States minister to Greece and Montenegro. He is the author of *Kantian Ethics and the Ethics of Evolution, The Ethical Import of Darwinism, Belief in God, Agnosticism and Religion, A Generation at Cornell, Philippine Affairs, a Retrospect and Outlook, The Balkan Wars* and *Why America is in the War* (1917).

SCHURZ, *shoorts,* CARL (1829–1906), a prominent American orator and political leader, born at Liblar, Prussia, and educated at the universities of Cologne and Bonn. His liberal ideas forced him to quit Germany in 1848, and he acted as a newspaper correspondent from Paris and London. In 1852 he emigrated to the United States and settled in Watertown, Wis. In 1857 he was an unsuccessful Republican candidate for lieutenant - governor and two years later he began to practice law in Milwaukee. He was made brigadier-general in the Federal army in 1862 and fought at Bull Run, Chancellorsville, Gettysburg and Chattanooga. After the war he became a newspaper correspondent, and finally editor of the Saint Louis *Westliche Post.* In 1869 Schurz was elected to the United States Senate. He was appointed by President Hayes as Secretary of the Interior, and at the close of the administration he became editor of the New York *Evening Post.* He was president of the National Civil Service Reform League from 1892 to 1901.

CARL SCHURZ

SCHUYLER, *ski'ler,* PHILIP (1733–1804), an American stateman and general of the Revolutionary war, was born at Albany, N. Y. He served with great credit in the French and Indian War, and was elected a delegate to the Continental Congress in 1775. Soon after the Battle of Bunker Hill he was appointed major-general in the Continental army, in command of the Northern New York division. Later he fought against Indians and Tories in New York and made a treaty of alliance with the Six Nations. Hampered and accused by superior officers, he resigned his commission, demanded a court of inquiry, and was acquitted with honor. He remained in the army, but was superseded by General Gates. To Schuyler, however, belongs the credit for Burgoyne's surrender (see SARATOGA, BATTLES OF). Schuyler was later elected to numerous state offices and to the United States Senate.

SCHUYLKILL, *skool'kil,* a river which rises in the northeastern part of Pennsylvania, in the Blue Mountains, and flows southeastward into the Delaware, five miles below the city of Philadelphia. It furnishes the chief water supply of Philadelphia, and power for manufacturing plants at Reading, Pottsville, Phoenixville and Morristown. Its length is 120 miles, and it is navigable as far as Philadelphia for boats of 400 tons.

SCHWAB, CHARLES M. (1862–), an American capitalist and president of the United States Steel Corporation, was born at Williamsburg, Pa. His first connection with the steel industry was as a stake driver in the engineering corps of the Edgar Thompson Steel Works, of which institution he later became superintendent. He rose steadily to the position of general superintendent of the Homestead Steel Works, and in that capacity served until 1897. In 1903 he became president of the Bethlehem Steel Corporation, which prospered wonderfully under his control; in 1915 he went to London and secured enormous munition contracts to supply the allies during the World War. In 1918 Schwab was appointed director-general of shipbuilding, in the United States Shipping Board Emergency Fleet Corporation. He is the author of an inspirational book, *Making Life Worth While.*